1992 IMPLICATIONS OF A SINGLE EUROPEAN MARKET

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DEFENCE, AEROSPACE AND TRANSPORT

July 1991

ACKNOWLEDGEMENTS

Raymond Chabot International Inc. (RCI), the Bureau d'information et de prévisions économiques (BIPE) and Informetrica Ltd. would like to acknowledge informative interviews with William C. Weston and Levon Markaroglu (The Aerospace Industries Association of Canada); Jacques Bonaventure (Héroux Inc.); Robert E. Marcille (Indal Technologies Inc.); Edward S. Richmond (UTL Canada Inc.); Dan Walch (Canadian Aeronautics Limited); Reginald Dorrett (External Affairs and International Trade Canada); Jean-Yves Leblanc (Bombardier Inc.); Yves Bélanger (GRIM, UQAM); René Wassil and Robert G. Sandor (External Affairs and International Trade Canada); and Derrick Sloan (Industry, Science and Technology Canada).

This report was prepared by Jean Cantin, consultant for RCI, with the collaboration of Lyne Raymond under the direction of RCI, BIPE and Informetrica for External Affairs and International Trade Canada.

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92-01055/

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LIST OF ACRONYMS AND ABBREVIATIONS

EC	European Community (Belgium, Denmark, Federal Republic of Germany, France, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, United Kingdom)
ECU	European Currency Unit (=C$1.59: December 1990)
EEIG	European Economic Interest Grouping
EFTA	European Free Trade Association, free-trade zone formed in 1973 (Switzerland, Austria, Sweden, Norway, Iceland, Finland and EC countries)
ESA	European Space Agency; current members states are Belgium, Denmark, France, Federal Republic of Germany, Ireland, Italy, Netherlands, Spain, Sweden, Switzerland, United Kingdom, Austria and Norway. Finland is an associate member, and Canada has an agreement for close co-operation
ESPRIT	European Strategic Program for Information Technologies
EUCLID	European Collaboration for the Long Term in Defence (Belgium, Denmark, Federal Republic of Germany, France, Greece, Italy, Netherlands, Norway, Portugal, Spain, Turkey, United Kingdom)
EUREKA	European Research Co-operation Agency (Belgium, Denmark, Federal Republic of Germany, France, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Turkey, United Kingdom, Austria, Finland, Sweden, Switzerland, Yugoslavia)
EUROGROUP	Established in 1968 and composed of all European NATO nations except France and Iceland
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GNP	Gross National Product
IEPG	Independent European Program Group, established in 1976 with the assistance of the Eurogroup (Belgium, Denmark, Federal Republic of Germany, France, Greece, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Turkey, United Kingdom)
ISO	International Organization for Standardization
ISTC	Industry, Science and Technology Canada
IUR	International Union of Railways
LLAD	Low Level Air Defence
NATO	North Atlantic Treaty Organization (Belgium, Denmark, Federal Republic of Germany, France,[1] Greece, Iceland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Turkey, United Kingdom, Canada, United States)
NORAD	North American Aerospace Defence Command
RACE	Research in Advanced Communications Technologies in Europe
R&D	Research and Development
TMST	Trans-Manche Super Train
WEU	Western European Union; current member states are Belgium, France, Luxembourg, Netherlands, United Kingdom, Federal Republic of Germany, Spain, Portugal.

EXECUTIVE SUMMARY

The opening of intra-Community competition in public procurement markets is one of the major objectives of Europe 1992. An indication of the importance of this initiative is that, together, these markets represent approximately $600 billion annually, or the equivalent of Canada's gross national product (GNP). For the aerospace, defence, and urban and inter-city transport industries, national governments and associated agencies and corporate entities are the most important sources of business. Thus, the measures that are envisaged to change contracting practices in the European Community (EC) public markets will have a potentially significant impact on companies within these three industries. This study, consequently, focuses on the impact of actual, contemplated and projected changes to those major public procurement markets in the EC and their consequences on these Canadian industries.

Changes in public procurement contracting policies of EC member states are projected to have a significant impact on the three industries studied in this report, since these policies have generally worked to prevent intra-EC trade, reduce the competitiveness of European companies, and bar companies outside the EC from penetrating the EC's markets.

Historically, individual EC member states have almost exclusively favoured domestic suppliers for public procurement. In the urban and inter-city transportation industry, as well as in the defence industry, national policies have led to a fragmented industry, the creation of national champions and inflated manufacturing costs and have also discouraged the harmonization of standards and regulations. In the aerospace industry, Europeans began developing a Community perspective in the early 1970s. Aerospace companies have increasingly worked together since that time. Nevertheless, the development of an EC-based aerospace industry structure is not entirely reflected by the purchasing policies of member states.

Changes and Implications of Europe 1992

The impact of Europe 1992 will vary significantly for each of the three industries. The final form of the measures regulating the opening of public procurement markets will substantially govern the impact. Furthermore, market conditions are evolving in different ways for each of the industries, adding an additional degree of uncertainty to predictions concerning these industries. This is particularly true of defence-related industries. It should be kept in mind, however, that the purpose of liberalizing public procurement markets is to open contracts to intra-EC competition in order to benefit the EC's industries, rather than to allow non-EC companies an opportunity to penetrate the Community's markets. Canadian industry could either gain or lose from this opportunity.

. **Aerospace**

The EC directives regarding public procurement markets of entities operating in the transport industry do not govern air carriers. Nevertheless, market conditions combined with foreseen changes in public procurement and the EC's Research and Development (R & D) support programs will significantly change the European aerospace industry's structure and competitiveness and will have an impact on Canadian companies. Civil commercial aerospace goods demand is expected to grow as anticipated Community air traffic deregulation, economic growth and increased trade stimulate civil commercial aircraft orders in the 1990s. In the short term, an increase in demand for regional aircraft is expected. In the long term, an increase in demand for wide body aircraft is also expected, as airlines respond to congestion at large urban air traffic centres.

The European industry's response to these and other changes has been to concentrate. The recent formation of Deutsche Aerospace from AEG's electronics interests and the aerospace operations of Dornier and MTU exemplify this trend. Clearly, it is the intention of European industry to take substantive measures to improve its competitive ability.

One trend in particular that will have an impact on the European aerospace industry and market is the anticipated decline in demand for defence aerospace goods. In this sector of the industry, emphasis is expected to be placed on extending the lifespan of current equipment and purchasing surveillance equipment rather than combat aircraft.

. **Defence**

With respect to the overall defence industry, the EC has no jurisdiction on exclusively military matters. Moreover, the directive proposal governing previously excluded sectors states clearly that it does not extend to contracts relating to state security matters. Nevertheless, steps taken by the Independent European Program Group (IEPG) are causing a movement away from nationally based defence industries to an EC-based defence industry structure.[2]

The recent and ongoing restructuring of the EC's defence industry is the result of several forces. The process was initiated as Europeans "played their cards well" under NATO and succeeded in building a European military complex over the last 10 years. Since Canada does not have a defence industry in the sense that other European countries do, it is likely to be vulnerable to changes occurring in Europe. In other words, the restructuring of the EC's military complex in anticipation of changes in the EC's defence markets is bound to have some negative effect on Canadian companies.

Actions such as the adoption of Article 30 (6) of the Single European Act, which endows the European Commission with the right to oversee the preservation of technological and industrial capabilities necessary for Community security, indicate that the opening up of defence markets will apply only to EC companies. The nature of discussions, particularly the concept of "juste retour" (balanced trade), indicates that Canadian companies can increasingly expect to be at a disadvantage when attempting to sell in the EC. Furthermore, the strengthening of European competitors, not only in their own internal market, but also in third markets (more precisely, the U.S. market) -- clearly the objective of improving the EC industries' competitive ability -- poses a serious threat to Canadian companies in view of already shrinking defence markets. There also exists a definite need to protect crown-owned technology; otherwise Canadians may be losing advantages that were gained at great expense. Finally, the size of the large manufacturers that will emerge from the wave of rationalization will reduce EC internal competition to better prepare for external competition. This will enable these manufacturers to absorb the ever-increasing costs related to research and development, production, and the marketing of new technologies.

In addition to these problems, the Canadian defence industry faces the possible imposition of new tariff or non-tariff barriers to access of EC markets. According to the European Commission, tariff exemptions granted by member states on certain items supposedly intended for defence purposes have caused the loss of close to $260 million in government revenues, since some of these items are subsequently released into the civilian economy without recovery of customs duties. The EC Commission has permitted a temporary suspension of duties at 0 per cent to cover a list of equipment that could conceivably be expanded to include components and sub-assemblies. If a tariff is assessed to protect the EC industry, future trades in defence goods could be seriously inhibited, as well as trade in dual-use high technology items.

. **Urban and inter-city transport**

Urban and inter-city transport, the final industry studied in this report, comprises both the bus and rail sub-industries. The opening up of these markets is currently having a different impact on each of the two sub-industries. The bus industry has begun to restructure its international operations, in general avoiding change in Europe. In contrast, the rail industry is increasingly concentrating around two entities, GEC-Alsthom and Asea Brown Boveri (ABB).

Both industries are, however, eventually expected to undergo a substantial rationalization. The rationalization of the bus industry has been delayed, in spite of the fact that bus operators are not expected to provide the industry with substantial orders. This is perhaps a result of the fact that measures meant to open up procurement are unlikely to be implemented in the medium term. These measures will probably be delayed because nationally owned domestic producers in the EC are not perceived to be in a position to cope with intra-EC competition.

The situation in the rail industry is substantially different. Already ABB and GEC-Alsthom have emerged as leading players, and it is expected that non-leading companies will have no choice but to opt for niche strategies. Furthermore, the planned installation of high speed rail networks across Europe is expected to provide EC rail companies with considerable business opportunities. In spite of measures aimed at opening this market, national considerations will probably continue to influence purchase decisions. Thus, Canadian exporters will probably continue to find it difficult to penetrate the EC market.[3] In contrast, Canadian companies with production bases in Europe, such as Bombardier, will be in a good position to take advantage of new opportunities, since they will be treated as EC companies.

Strategies

Generally, the opening of European procurement markets to EC-wide competition will have positive results only for Canadian companies that operate from a European base (for example, a subsidiary). Recently approved measures, however, make no specific mention of the rights of non-EC contractors, although they continue to give preference to companies that offer at least 50 per cent Community content in their products. Overall, Canadian companies operating in the aerospace, defence or urban and inter-city transport industries are all at risk from reinvigorated European competition. Companies who choose to ignore developments in the EC may soon find themselves competing in their domestic and third markets with European competitors.

In all three sectors, the current restructuring movement creates opportunities for Canadian enterprises with the means of reinforcing their presence in Europe through mergers, acquisitions or joint ventures. Opportunities also exist for Canadian companies to make sales by working with European contractors or for North American companies that are selling in Europe through EC-based subsidiaries. Finally, pursuing a highly specialized niche has proven to be a successful strategy for many Canadian companies, since companies that are able to establish themselves in highly specialized niches will obviously continue to sell their product(s) in the EC with an ease relative to their level of domination of the global niche market.

For those companies unable to reinforce their presence in the EC, measures should be undertaken to strengthen their position on the North American market. Thus, expanding operations to cover thoroughly both Canadian and American markets will become a necessity for these companies. Furthermore, a continuing emphasis on R & D will be important for Canadian companies, given the EC's emphasis on this competitive advantage. Canadians need to emphasize co-ordinated R & D with other Canadian companies and with foreign industries. This emphasis could help further refine niche markets.

. **Aerospace**

In the aerospace industry, companies selling to Europe's airlines will have to pay particular attention to Article 24 of Directive (89) 380. Information regarding the possible application of measures concerning public procurement markets to airlines is vital to companies selling to these corporations. However improbable, the extension of the proposed measures to include carriers such as Lufthansa would likely adversely affect Canadian industry, since the application of the 50 per cent EC content rule to commuter aircraft would effectively eliminate all non-European aircraft from the EC market.

Whenever possible, Canadian companies should undertake measures to ensure their participation in the EC market. Because of air transport deregulation and the increased level of trade likely to result from the Europe

1992 initiative, the market in Europe for commercial aerospace goods is expected to be strong. Thus, by ignoring developments in Europe, Canadian companies would be bypassing an opportunity.

. **Defence**

Canadian defence companies are unlikely to escape a negative impact as a result of the Europe 1992 movement. In the short term, possible imposition of tariffs on defence or dual-use products remains a particular threat that companies must either prepare for or lobby against. Reducing dependence on defence markets, however, seems to be the best long-term option for Canadian companies.

Faced with the challenge of a rapidly evolving world defence industry and market, the Canadian defence industry will have no choice but to try to maintain a technological edge, which has been the hallmark of its success. It should also continue to focus on niche markets and subsystems rather than whole systems, which it has done since 1959. Above all, Canadian companies within the industry will have to ensure their presence in Europe and increase their participation in European programs to maintain existing European business, however small this participation may be in relation to their traditional markets. It is unlikely, however, that defence exports to Europe will fare better after 1992 than they do currently. The Canadian industry should not have any unrealistic hopes of realizing a greater proportion of defence sales to Europe relative to its traditional markets in the U.S. in the 1990s.

. **Urban and inter-city transport**

With respect to the urban and inter-city transport industry, large Canadian companies with major investments in the EC, such as Bombardier, will benefit in the same manner as EC companies from the opening up of the EC's public procurement markets. For Canadian companies without a European presence, however, EC public procurement markets will remain difficult to penetrate. Thus, for Canadian companies without a European presence, the importance of pursuing a niche strategy or of realizing major cost advantages over European competitors is accentuated.

OPENING OF EC PUBLIC PROCUREMENT MARKETS

Public markets, which constitute a major part of economic activity, continue to be plagued by discriminatory practices. By systematically favouring domestic suppliers over foreign ones, public buyers are being denied the benefits of increased competition.

Extract from the Cecchini report, *1992: A New European Economy*, March 1988.

Before proceeding to a discussion of the major public procurement markets represented by the aerospace, defence and urban and inter-city transport industries, it is important to understand the significant role that public markets play in the European economy. Public markets (government procurement markets) represent approximately $600 billion for the European Community (EC), or approximately 15 per cent of its gross domestic product (GDP).[4] In consequence of the aggregate size of EC public markets, regulation changes applicable to them have the potential of changing both the structure of industries and their method of doing business. This report studies three industries that are particularly sensitive to such regulation changes because of the large proportion of sales that each directs to public sector clients. In the EC, aircraft purchases were worth $12.9 billion in 1986, urban and long-distance transport equipment purchases were worth $5.4 billion in 1986[5] and military purchases were worth $39.6 billion in 1988.[6]

The structure and importance of public procurement markets in the EC vary from country to country. State-owned enterprise and government shares of public purchases vary considerably between member states. For instance, in Belgium, state-owned enterprise purchases account for 63 per cent of public purchases. In France, the Federal Republic of Germany and Italy, they represent between 35 and 40 per cent. Public purchases covered by formal purchasing procedures represent approximately $400 billion in the EC (between 7 and 10 per cent of its GDP). The importance of public purchases covered by such procedures within each member state, however, again varies. These purchases represent about 8 to 11 per cent in Belgium, 6 to 9 per cent in France, 5 to 8 per cent in the Germany, 6 to 8 per cent in Italy and 10 to 14 per cent in the U.K. Purchases not covered by formal procedures are current expenses such as electricity, insurance, telephone, heating and rents.

Contract awarding practices by government agencies have been considered to be discriminatory, and, as a result, there is very little intra-EC trade in public procurement markets. Penetration of public procurement markets by imports has been much lower than it has for the economy as a whole. In fact, the share of imports in public procurement markets in the major member states is estimated to vary between 0.4 per cent (in the U.K.) and 3.8 per cent (in the Federal Republic of Germany), compared with penetration by imports for the economy as a whole from a low 19 per cent (in Italy) to a high 42 per cent (in Belgium). In spite of the existing differences between member states (in the structure of the public sector and in the contract awarding procedures), certain common points can be found. In all member states, markets such as military equipment, telecommunication material and railway equipment have a high degree of government control.

Since 1971, the EC has sought to liberalize government procurement markets by adopting two directives[7] that required member states and national administrations to co-ordinate market procedures for entering into contracts (that is, markets in which the client is the state or the public administration), as well as to open access to contracts to all EC companies. Until March 1987, however, there were two important exceptions to the directives: first a minimum level of applicability for public works (one million ECU) and for public supplies (200 000 ECU) and, second, the exclusion of some sectors (hydro, energy, telecommunications and transports).

In view of the apparent lack of success of these measures, the European Commission made significant amendments to the existing directives (which did not apply to the excluded sectors). These amendments and proposals were developed in order to improve the transparency of procedures for service offers, invitations to tender, and tenders.

- harmonization and simplification of procedures;
- improvement in the quality and availability of information;
- increased bid submission time;
- modification of minimum levels of applicability to increase the effectiveness of the procedures (in considering only contracts for works exceeding 5 million ECU);
- allowance for the lowering of the minimum level of applicability for specialized works, to avoid requests for tenders benefiting only large companies capable of successfully bidding on large contracts; and
- reinforcement of the Commission's jurisdiction as it relates to these fields, enabling it to cancel procedures that are not in keeping with the directives.

In October 1990, the Council of Ministers approved a directive that applies to the sectors previously excluded. The directive is addressed to procurement agencies that evolved under the EC's non-competitive conditions, where national suppliers were favoured, whether their status was public, private or mixed. It extends the coverage of the EC-mandated procedures to contracts undertaken by private companies for large infrastructure works directly subsidized for more than 50 per cent and by companies holding concessions for the execution of public works. Thus, the Commission proposed to

- create a list (nominative or by category) of agencies issuing tenders that are subject to this directive;
- reintegrate most of the directives' improvements adopted in 1988;
- encourage the public sector entities affected to refer to performance specification standards rather than technical standards, which may prove to be too specific; and
- impose minimum contract levels, which must be published in the official Community journal, in accordance with the 1988 directives (200 000 ECU for public supplies and 5 000 000 ECU for public works).

Due to the complex economic, industrial and operational nature of the awarding entities, however, the Commission has decided to allow them considerable leeway with regard to regulations (compared with that allowed with regard to the adopted directives of 1988). Thus

- the awarding entities must encourage competition, but in doing so may opt to use one type of procedure or another;
- the awarding entities issuing requests for tenders continue to have the right to impose compulsory qualifications and requirements on their suppliers;
- when competition is non-existent or dictated by other conditions, the purchasing entities may elect not to open contracts to competition; and
- EC companies holding governmental concessions (similar to companies such as Bell Telephone in Canada) will benefit from procedures that have greater flexibility with regard to contract awarding. The promotion of competition remains the principal objective.

For the EC, the opening of government procurement markets will

- create healthy competition between national and foreign suppliers;
- initiate industry restructuring to increase EC competitiveness; and
- enable purchasers to obtain the lowest price or the most economically advantageous conditions from suppliers.

The opening of government procurement markets to all Community companies will be slow and progressive. Although the process is under way (see Table 1 in Appendix A), locally established companies will continue to benefit from a competitive edge.

In spite of this, Community companies wishing to benefit from this opening will have to establish certain strategic capabilities aimed at overcoming remaining cultural, normative and linguistic barriers. As an illustration, certain EC companies have more difficulties in exporting to EC member countries in Europe (for example, to the Federal Republic of Germany and the Netherlands due to national standards and to Italy because of its cultural aspect) than to Third World countries.

Even though many problems remain to be solved before the liberalization of government procurement markets is achieved, markets are already in the process of opening up in many areas (for example, telecommunication, transport and energy). It is, therefore, important for Canadian companies to attempt to penetrate these markets without delay, since long-term relations between suppliers and contracting parties, particularly in these markets, are the rule rather than the exception. In several high-tech equipment markets, in which specifications cannot always originally be defined, long-term buyer-supplier relationships are a necessity for the successful completion of projects. Since successive market studies are needed to define specifications and new and old equipment must remain compatible, one contract frequently leads to the next for the sake of maintaining coherent and functional systems.

European and Canadian companies wishing to take advantage of the opening of these public markets must not wait for their realization; rather they must now explore the possibility of establishing strategies, in view of the official opening of these markets. They also must realize that there is a cost associated to these strategies, especially for small and medium size companies. These costs, in actual funds or in human resources, have to be weighed against the benefit that could arise from the decision to take advantage of foreseen opportunities.

1. CONTEXT AND TRENDS

1.1 Aerospace Industry

a) Canadian Aerospace Industry

To provide an indication of size, Canada's aerospace industry sales were approximately $7.7 billion in 1989. Close to 70 per cent of those sales were directed to export markets, and 70 per cent of these exports were to the United States. In contrast, Canadian government procurement (particularly through the Department of National Defence) represents 15 per cent of total sales made by the industry.[9]

The Canadian aerospace industry is made up of companies that produce for both civilian and military markets. Approximately 70 per cent of production is civil and 30 per cent military, with a decline in the relative importance of the military segment. Companies have concentrated their operations in Ontario and Quebec, with 89 per cent of production taking place in these two provinces. In 1989, 12 companies accounted for 73 per cent of total Canadian aerospace industry sales.

Among the major Canadian manufacturers of complete aircraft, engines and systems are Canadair Aerospace Group of Bombardier (Challenger executive jet, Regional jet and CL-215), Boeing Canada de Havilland Division (Dash-8), Bell Textron Helicopter, Pratt & Whitney Canada (PT6 gas turbine engine and JT15D turbofan engine), Allied Signal Aerospace, Spar Aerospace (precision gears, gearboxes and transmission for rotary-wing aircraft), and Boeing and CAE Electronics (flight simulators).[9] The major manufacturers of subsystems and components are Bristol Aerospace, Fleet Aerospace, McDonnell Douglas Canada, Canadian General Electric (CGE) and Rolls Royce Canada.

In addition to pursuing an export strategy, Canada's industry has a general strategy of product specialization and niche market applications. Two-third of overall output in 1989 (66 per cent) fell into the category of proprietary products. The success of the Canadian aerospace industry has been highly dependent on how well it could carve out specialized niches for itself in the international marketplace. The Regional Jet by Canadair Aerospace Group of Bombardier, the Dash-8 by Boeing Canada, and Conair Aviation with its water bomber technologies are examples of such specialization.

The industry's major products consist of airframes and propulsion systems, which account for 42 per cent and 26 per cent of sales volume respectively, followed by avionics and space, which account for 13 per cent and 5 per cent of sales respectively, and defence electronics, which accounts for 8 per cent.[10] The airframe industry's product range includes corporate jets, regional airline turboprops, utility aircraft, helicopters and unmanned aerial vehicles. Propulsion systems' related activity includes a wide range of repair and overhaul work, component development and manufacture, and a small gas turbine line that holds a substantial portion of the world market. The avionics sub-industry features internationally competitive navigation and radar systems, electronic display, control and monitoring systems, world-class positions in-flight simulators, and air traffic control and battlefield reconnaissance drone systems.

The sales figures previously quoted clearly indicate that the Canadian aerospace industry is highly export oriented. Until recently, however, and with the exception of unmanned reconnaissance systems and gas turbines, Canadian companies exported few aerospace products directly[11] to Europe.[12] Throughout the past few years, there has been a steady growth in Europe's share of Canada's export sales (see Table 2 in Appendix A). These sales have taken the form of co-operative programs and procurement. Among the more important contracts are: (i) the Airbus subcontracts won by Canadair Aerospace Group of Bombardier, (ii) sales of CL-89/289 unmanned airborne reconnaissance systems to the Federal Republic of Germany and France, (iii) the sale of Challengers and of Regional Jets to the Federal Republic of Germany and the United Kingdom, (iv) the sale of CAE Electronics flight simulators for the Tornado and EFA (fighter jets) programs, (v) purchases made by British Aerospace, Shorts and ATR[13] of Pratt & Whitney Canada

engines and (vi) sales of engine components by Rolls Royce Canada to its U.K. parent.

Rather than concerning itself with the EC, historically Canada's industry has focused on the U.S. market. In fact, the Canadian industry is structured in a way that is complementary to the American industry. Over 70 per cent of commercial transactions in this sector are with the U.S. Canadian exports are in the form of subsystems and components and subcontracted production for American contractors and the United States Department of Defense. As a result, Canada has become the largest supplier of aircraft parts to the U.S. (followed by France, Japan, Italy and the United Kingdom). In return, Canada imports 55 to 60 per cent of the aircraft and systems Canadian firms use (primarily first and second tier companies),[14] and the U.S. supplies over 90 per cent of total material sourced outside of Canada. The U.S. is expected to remain a principal market, accounting for more than half of the Canadian aerospace output.

The revenue increase recorded by the industry in the past few years has been attributable largely to the many sources of demand in the American defence market[15] (for subsystems and parts manufacturers) and to the civilian aerospace market's reaction to air transportation deregulation. However, after an eight-year growth period, the U.S. defence budget risks being affected by cutbacks, resulting in decreased American military spending. As a result, the U.S. aerospace industry could reorganize its structure or modify its demand patterns. The future of the aerospace industry, consequently, lies not only in military applications but also in civil applications. The relatively small share of the defence components (about 30 per cent of total sales) should allow the Canadian industry to adapt quickly and adjust to the new realities of the market.

The decrease in the defence budgets of the United States and other developed countries will likely result in a continuing downward trend in military aircraft procurement. Moreover, many countries (new low-cost entrants from Southeast Asia, South America and Japan) are becoming increasingly autonomous with regard to the manufacture of military aerospace equipment. These countries can also position themselves in the global markets, thus reducing export market opportunities even more for Canada.

The dimensions of the shift in demand from the military to the civilian sector are illustrated by several statistics. Of total spending related to aircraft (US$68.1 billion) in the U.S. in 1989, 40 per cent was for civilian aircraft and 60 per cent for military aircraft. In contrast, in 1987, civilian aircraft represented 30 per cent of total spending on aircraft (US$59.8 billion).[16] For 1992, more than half of estimated U.S. aircraft spending (53 per cent) is forecasted to be attributable to commercial aircraft. U.S. spending on aircraft constitutes approximately 50 per cent of total American aerospace industry sales.

In spite of changes in the American market, including a reduction in the military segment, the U.S. still remains the largest aerospace market. The North American market, furthermore, represents approximately 70 per cent of the world aircraft turbine engine fleet and will thus remain the prime market for the Canadian aerospace industry. Nevertheless, one recent example of a Canadian aerospace company's sales effort reflects the profitability of bidding for contracts in the smaller EC market. The Canadair Division of Bombardier was recently awarded several large procurement contracts for its new 50 passenger aircraft, the Regional Jet (RJ). Deliveries of this aircraft are expected to begin in 1992. Although the U.S. market is the largest in the world, the Canadian industry should not ignore opportunities that exist in Europe.

In summary, the Canadian aerospace industry is very competitive with respect to certain market niche products (gas turbines, small aircraft, inertial navigation systems, infrared surveillance systems, flight simulators, satellite subsystems and aircraft environmental control systems). Despite the handicap of an extremely limited domestic market (both civilian and military), Canadian companies have performed well by concentrating their efforts on exports and by entering into teaming arrangements with the U.S. on a North American defence industrial base. The Canadian aerospace industry is one of the high technology leaders in the Canadian manufacturing sector and is characterized by state-of-the-art technology development. However, in these times of rapidly changing

technology, and in an increasingly competitive global marketplace, the Canadian industry must remain competitive by investing more of its resources into R & D. The Canadian aerospace industry invests approximately 10 per cent of its revenue in R & D. This is respectively 7.5 per cent and 6 per cent less than its American and European counterparts.[17] At the same time, Canada will also have to increase subcontracting and co-operative agreements with large international manufacturers to reduce the technological and commercial risks inherent in the development of new technologies.

Canadian Space Industry

The Canadian space industry is a distinct component of the aerospace industry, although it is relatively small in comparison to its counterparts in other developed nations. This industry is highly dependent on Canadian government procurement[18] for its domestic market, and the Canadian market is of limited size; therefore, companies within the industry, as in the rest of the aerospace industry, have had to look to exports in order to survive (in 1986, 70 per cent of sales were exports). This is necessary in order to reach a level of sales that would support continued growth and a level of R & D necessary to maintain a competitive edge. Moreover, they are forced to compete on the basis of better technology, since the absence of volume production makes for lower price competitiveness compared with companies from the U.S., Europe and Japan.

There are approximately 50 Canadian companies, most of them Canadian owned, involved in the space industry. The only Canadian prime contractor manufacturing complete space systems is Spar Aerospace. Spar, a world-class satellite manufacturer, secures almost half (approximately $400 million) of all sales of the Canadian space industry. Spar, along with the other major players -- MacDonald Dettwiler (SAR imagery), Com Dev (subsystems for satellites), Canadian Astronautics (advanced scientific experiments in space), SED Systems and Intera Technologies -- makes most of the industry sales.

The companies of the Canadian industry specialize in communications, remote sensing satellite systems[19] and, to a lesser degree, robotics for use in space. Basically defined, the following classifications identify the product categories in which Canadian companies are active:

- communication satellite systems and subsystems (space-segment payloads such as antennas, transponders, signal processors, and transmitting and receiving stations and antennas);
- remote sensing satellite systems and subsystems (space-borne sensors and material for the reception, processing and analysis of remotely sensed data);
- robotics and space tele-operators (tele-operators [man-in-the-loop, Canadarm-type manipulators], next generation of automatic dexterous manipulators for the international space station program);[20] and
- launch systems (small sounding rockets for scientific experiments).[21]

Canada is one of the principal markets for and end-users of space products and services, along with other developed countries. (It follows the U.S.S.R., the U.S., Japan, France and the Federal Republic of Germany; it ranks equally with the U.K. and Belgium.) Canada was the third nation to put a satellite into space (Allouette 1 in 1962) and the first to establish its own domestic telecommunications system using a geostationary orbiting satellite (Anik A1 in 1972).[22] Nevertheless, the domestic market remains insufficient to sustain a national industry.

Space product procurement for non-military use in industrialized countries has been increasing (see Table 4 in Appendix A). However, expenditures for military space procurement are considered to be much greater than civilian expenditures, especially in the U.S.

The Canadian space industry retains an important share of the world market for some specific subsystems. For example, Com Dev manufactures about 70 per cent of the radio frequency multiplexing subsystems (signal-processing devices) used in communication satellites in the free world; MacDonald Dettwiler (MDA) is a worldwide leader in the field of reception, processing and analysis of remotely sensed data; Spar Aerospace manufactured

all the remote manipulators (Canada is the leader in this field) used by the U.S. space shuttle program; and Canadian Astronautics (CAL) supplied most of the Sarsat (search and rescue satellite) ground receiving stations. Canadian leading edge technology projects currently under way include the satellite RADARSAT scheduled for launch in 1994 and MSAT, the world's first domestic communications satellite for mobile users.

In addition to dominating certain subsystem markets, Canadian companies have expertise in selling communications satellites systems in: (i) the private market sector, such as U.S. companies and owners or operators such as Intelsat and Telesat; (ii) the public market sector, such as the governments of Brazil, India and Indonesia and the European Space Agency (ESA); and, to a lesser extent, (iii) the military market. Specifically, in the field of remote sensing satellite systems, Canadian companies have expertise in selling to public sector market customers such as the Canadian government, the governments of India and Japan, and ESA. In the field of space robotics, Canadian companies have demonstrated expertise in sales to the public market sector through government procurement. Sales to Japan and to organizations such as NASA and ESA are evidence of this ability.

In conclusion, like the more traditional part of the aerospace industry, the space industry is witnessing a rapid increase in international co-operation. For instance, the Canadian government has signed co-operative agreements with Japan, India, ESA (in 1978 and in 1984), and NASA. Canada is associated with the ESA through a co-operative agreement (CTS, Olympus, ERS-1 and -2, PSDE, Hermès, DRTM and ASTP) and also has collaborative agreements with France (SPOT, COSPAS/SARSAT, WINDII/UARS) -- which also include the U.S.A. and U.S.S.R. (COSPAS/SARSAT). Canadian companies are likely to continue to find their success in market niches for high-tech systems and subsystems in which performance is an essential element.

b) European Aerospace Industry

The EC internal aerospace market and industry are both relatively large in size. The European aerospace market is the second largest after the U.S. market. In 1987 the European market represented about 40 per cent of the U.S aerospace production value. In terms of production, sales made by the European companies in the aerospace industry reached approximately $58 billion in 1988, more than half of which originated from sales to external markets.

The importance of the European aerospace industry increased rapidly in the 1970s. At that time, the production value of the EC was only 20 per cent of that of the U.S. as opposed to 40 per cent in 1987. Furthermore, the industry increased its share of the world market from 5 per cent in the early 1970s to 25 per cent in the mid 1980s. Finally, a European government-led and financed co-operative effort has allowed the industry to make a successful comeback on the important world market for large commercial transport aircraft with the development and introduction of the Airbus family.[23]

The promotion of industrial co-operation has played a significant role in the European aerospace industry's recently improved performance. Currently, a large part of the total production in the sector is based on international co-operation in the form of joint projects and programs (for example, Airbus, Tornado, Alfajet, ATR, CFM56-engine, and Ariane) involving companies from different European countries and even non-European partners.

Major European aerospace companies and most European aerospace production are located in four EC member states (see Table 5 in Appendix A): the United Kingdom (40 per cent), France (30 per cent), the Federal Republic of Germany (12 per cent) and Italy (9 per cent). Spain, in contrast, accounts for 1 per cent of production. The United Kingdom and France together monopolize 70 per cent of the EC activity in this industry.

The aerospace industry in Europe is divided into two sub-industries: (i) the production of military products such as fighter and training aircraft, military helicopters and missiles and (ii) the manufacture of civilian products, such as commercial jets, commuter aircraft, helicopters and engines. In the early 1980s, military production in this industry represented 70 per cent of total industry output. Since then, however, the percentage of civilian products has increased and presently represents 36 per cent of the total value of

EC aerospace production.[24] Although it appears that the trend may continue because of the continuing expansion of civil aviation and the relative weakness of military demand, it may be prudent to re-evaluate this trend in view of the significant political and social changes in Eastern Europe and the Middle East.[25]

The European aerospace industry can also be broken down into four products groups: (i) airframes (for planes, helicopters and missiles), with a 49.2 per cent production share; (ii) engines (for airframes), with 17.6 per cent; (iii) equipment and avionics for airframes (such as electronic and hydraulic systems), with 27.8 per cent; and (iv) space equipment (launch vehicles and satellites), the smallest but most dynamic group, which grew from a 3.1 per cent production share in the early 1980s to 5.4 per cent.

In addition to the space equipment group, the equipment and avionics group also showed a growth ratio above the industry-average in the 1980s, mainly because of the increasing volume of onboard electronic equipment and the advent of the spacecraft production.

Civilian Aerospace Industry

The aerospace industry outlook for the next few years looks good, especially for production of civilian products.[26] The average annual growth rate of the European aerospace industry's real production for the 1982 to 1988 period was 3.1 per cent, and for the 1988 to 1994 period it is expected to continue growing at 4.5 per cent per annum.[27] For the same period, the expected average annual growth rate of production (at 1988 prices) for major EC member states is as follows:

Member state	Estimated average annual rate of growth for the period 1988-1994 (per cent)
France	5.5
F.R.G.	5.6
Italy	7.7
United Kingdom	2.5
Spain	9.2

. **Air transport**

The International Air Traffic Transport Association (IATTA) estimates that passenger and freight traffic will both grow at between 7 and 8 per cent per year over the period 1989-1993. Moreover, the phasing out of old aircraft, partly because of their poor fuel efficiency and partly to meet stricter guidelines for safety and pollution, will boost demand for civilian aerospace goods.

Regardless of European efforts, the largest market in the world should remain the U.S. It is also expected that the European market's share of the global market will diminish over the next 15 years as a result of the increased importance of the Asian and Pacific markets.

. **Commercial jet**

European commercial jet production should continue to expand, with the strongest growth category in the short term being short- and medium-haul, narrow-fuselage aircraft; in the longer term, airport and air space congestion will force airlines to shift to the long-range wide body aircraft.

. **Passenger commuter aircraft**

The demand for smaller passenger commuter aircraft, such as those equipped with turboprops, will grow to meet the needs of short distance transportation for regional air travel.[28] European companies manufacture six out of the eight aircraft families of commuter aircraft in existence in the upper end of the market, and have held more than 80 per cent of the market since the beginning of the 1980s. The European industry is well placed to benefit from this currently fast-growing segment.

Military Aerospace Industry

In general, the growth of the military aerospace industry will slow down because of the tendency to trim defence budgets in industrialized countries and because of the reduced possibility of a major conflict between the superpowers. There is also an increasing tendency to build military aircraft within international consortia. This has made it necessary for companies to cope with huge R & D

expenditures and to ensure a sufficiently large market for final products. For example, this formula has proven successful with the Tornado aircraft.

- **Helicopters**

There are four European helicopter manufacturers (Aérospatiale, MBB, Agusta and Westland),[29] all capable of developing and producing models on their own. However, the European helicopter industry's effort has largely been limited to the smaller end of the spectrum of military helicopter types (with purchase of large, load-lifting military helicopters from the U.S.). The European market is not sufficiently large to support all European companies with indigenous designs, particularly because they concentrate mostly on the same end of the helicopter model spectrum. The resultant intra-European competitive pressure, combined with competition with the four U.S. producers (Boeing, Sikorsky, Bell and McDonnell Douglas), has increasingly forced European companies to undertake joint programs. Thus, there have been several co-operative programs between the major helicopter-producing European countries, for instance, the Anglo/French agreement to produce complementary types of aircraft (Puma, Lynx, Gazelle). Nevertheless, European companies have demonstrated that they can be competitive on their own. This is illustrated by Aérospatiale's investment in the U.S. and its success in obtaining a contract to provide helicopters (Ecureuil) to the U.S. Coast Guard.

- **Engines**

Since the 1980's, the European aircraft engine industry has been marked by a period of growth similar to that recorded by the airframe production industry. European commercial jets have so far been fitted mainly with American engines. Thus, the growth of the industry is due mainly to the fact that American aircraft are being fitted with engines produced wholly or partly in Europe (Rolls Royce RD211 and CFM56 manufactured by General Electric U.S. and SNECMA in Europe).

European Aerospace Co-operative Programs

An overview of the European aerospace industry indicates clearly that co-operative programs have played an important role in the industry's development. An understanding of European aerospace co-operative programs is thus important for Canadian companies attempting to understand how the European industry functions.

Recently developed close collaboration between European builders has resulted in technological success stories such as the first supersonic commercial jet, the Concord; civil commercial aircraft such as the Fokker and ATR; military aircraft such as the Jaguar, Tornado, Alpha Jet, Transall and Atlantic; the previously mentioned Airbus; and the Puma and Gazelle helicopters.[30]

By supporting co-operative programs that call for builders from many countries to work together, the European aerospace industry has asserted itself during the past few years. In terms of market success alone, the result has been that, thanks largely to Airbus, the EC has gone from a net importer of commercial aircraft in the early 1980s to net exporter over the last few years. Airbus is now the second largest world supplier of civil commercial aircraft, with approximately 25 per cent of the market, and expects annual production to reach 200 aircraft by 1993 (up from 61 aircraft in 1988).[31]

In summary, European companies have been working together, and co-operation is growing, due to ever-increasing R & D costs, arising from the fine tuning of complete systems and other high technology products. This phenomenon is intensified by co-operation and mergers on national and international levels. Examples of this are MBB-Dornier-Daimler-MTU and GEC PLC-Plessey-Siemens, the Airbus and Tornado consortia, the U.S. collaboration on the F-16 program (production), and the international joint ventures of Snecma-General Electric (U.S.) and Lockheed-Aérospatiale. However, difficulties have been encountered in these collaborative efforts. Table 6 (in Appendix A) shows examples of European collaboration programs in progress.

Technological Developments

As mentioned previously, one of the main driving forces behind the growth of international co-operation in the aerospace industry is the need to invest large sums of money in R & D. The

aerospace industry is characterized by a large share of so-called "high-tech" products. In this domain, keeping up to date with technological change is a necessity. In the aerospace industry, the main objectives for technological development focus on

- lowering the operating costs for aircraft;
- protecting the environment;
- improving the performance and manoeuvrability of military aircraft and measures for low radar signature (or stealth); and
- routine mastering of launch technology for space equipment and lowering of related costs.

New Materials

The following summarizes future trends in the penetration of new materials for different product areas in the aerospace industry.

- In airframes (structures and structural material), there will be increased use of organic composite and advanced metal technology products such as the aluminium/lithium alloy.
- In helicopter engines, metal composite parts will be manufactured using silicon carbide reinforced aluminium crankcases, such as for the military helicopters HAP/HAC and NH-90.[32]
- In aircraft engines, (i) fibreglass, Kevlar or carbone reinforced (epoxides) will be used for the manufacturing of cold parts (up to 150 degrees celsius) acoustics panels, mazes and so on; (ii) Cerasep (silicon carbide reinforced fibres) will be used in the manufacture of certain hot parts such as turbine engine vanes, made by the Société Européenne de Propulsion (SEP) for the new military M88 engine to be used for the Rafale; and (iii) warm parts (about 300 degrees celsius) will be produced using thermoplastic resins. These developments are expected to increase the share (weight) of composites in aircraft engines from 2 per cent to 15 per cent in a few years.
- By the year 2010, it is expected that in military engines the proportional weight of composite materials will represent 60 per cent, with the compressors made of metal composites and turbines made of ceramics composites (silicon carbide and silicon nitrate), allowing for increased operating temperatures and efficiency.

Avionics

One group of products that should show a marked worldwide increase is that of avionics, which is the generic term encompassing all the electronic systems used in aircraft, engines, missiles, space shuttles and follow-up systems. The demand for sophisticated avionics systems has risen because these systems allow for the reduction of costs at several levels of production and operation. One reason for the increasing emphasis on improved avionics is that they can save aircraft manufacturers huge sums of money during the process of mid-life upgrading of aircraft by avoiding development outlays of entire new airframes. Furthermore, improved avionics allow for more efficient operation of the aircraft since these systems help improve navigation, optimize fuel consumption and reduce workload for the operating crew. In addition to reducing costs directly, avionics permit increased use of test and diagnostic procedures at all stages of management and of equipment and material production. Furthermore, with computerized design and testing, improved avionics allow for reduced delays in the development of new models of airframes. Thus, as the cost of developing new products across the entire aerospace spectrum rises and the development of major new types of civil and military aircraft therefore declines, the demand for sophisticated avionics systems is also rising.

The future trends in the field of avionics can be summarized as follows:

- widespread use of electronic controls in new military and civilian programs;

- use of new display systems and improved visualization of control panels (verbal command, miniaturization of view finders, multi-functional screens);

- progressive integration of piloting functions and navigation and the development of new high speed transmission architectures; and

- development of electronic control of non-electronic engine systems and circuits.

The expanding costs of avionic systems, which have risen along with those of other products, have caused companies active in the industry to either merge or form consortia with their counterparts in other countries. This has allowed groups of companies to bid for specific contracts on major new ventures, such as the European Fighter Aircraft (EFA) and the Airbus A330 and A340 airliners.

The European aerospace industry abilities in the area of technological development can be summarized briefly. European companies have played a leading role in the technological innovation of civil aircraft. Europe produced the first jet, the first supersonic aircraft, and the first short range/wide body aircraft. Currently, European civilian aircraft manufacturers are making use of more advanced technologies than their competitors in, for example, cockpit computerization and in active control and fly-by-wire technologies.

Research and Development

The ability to compete in an industry focused on technological development depends on effective R & D spending. In Europe, aerospace industry research and development spending accounts for more than 16 per cent of revenues and is financed in a proportion of 40 and 60 per cent respectively by the industry and governments.[33] Public financing of R & D in Europe has not followed the same pattern as in the U.S.; however, it has been compensated by increased R & D expenditures by the companies themselves (see Table 7 in Appendix A). All in all, the European aerospace industry's research expenditures represent only one-third of those of their American counterpart.

To summarize, the European aerospace industry is establishing itself as a world-class force in the growing international market. It seems to be in an excellent position to exploit the evolution of world markets in the 1990s, which should be characterized by a decline in military demand and growth in the civilian sector.

European Space Industry

The space portion of the European aerospace industry still holds only a small share of overall production. Nevertheless, EC space industry companies, like their American and Japanese counterparts, but unlike Canadian companies, have access to a larger internal market, which assures them a solid market base and enables them to realize economies of scale.

More than 180 European companies now play a direct part in European space activities. As a result, Europe has built significant technological and industrial capabilities in the fields of development and production. These capabilities, applicable to the spacecraft and launching vehicle sectors, are the result of national space research programs, European countries' international collaboration via the European Space Agency (ESA), and the EC's international industry consortia. These European companies (a large number of them state controlled) sell their products to ESA[34] programs and to national administrations. It should be noted that most of the member states of ESA maintain a national program that is generally aimed at maintaining a capability to participate in ESA programs. The governments of the U.K., the Federal Republic of Germany, France and Italy, for example, participate in industry space programs.

ESA is fundamentally an R & D organization and, in defining its program products, is more influenced by the search for technical excellence than by the possibility of commercial success. Canada participates in ESA and contributes to its operating budget. It is also entitled to participate in optional programs of the ESA to an extent that is commensurate with its financial contribution in these programs. It should be noted that some European countries have policies that restrict access to non-European companies in fields in which European companies are active.

European launch vehicle production is one field in which the capabilities of European companies are

well established. By the mid 1980s, the Arianespace series of Ariane launching systems had obtained almost half the commercial satellite launch world market.[35] Furthermore, following the misfortunes of NASA, the European launching vehicle Ariane began to win the interest of commercial satellite owners worldwide. Arianespace is expected to have a new generation of launching vehicles, Ariane 5,[36] in operation by 1995 and to market eight or nine vehicles per year during the next few years, 50 per cent of which are expected to be for non-European satellites.

Several governments now understand that commercial launching activities can help finance space development. Consequently, Arianespace and NASA are no longer the only ones operating in this field. In the U.S.S.R., Glavkosmos, the Soviet commercial space services agency, has had contracts with Intospace in Hannover, Federal Republic of Germany and with Payloads Systems in Cambridge, U.S. China has proposed to launch the telecommunications satellite Arabsat for less than half the amount it would have cost with Arianespace or McDonnell Douglas.[37] Thus, the U.S.S.R. and China, along with Japan, could become major participants in the commercial space launching market.

In the satellite field, the European industry has not been successful in penetrating the larger world market, mainly because of the scale of the business and ESA's nature and operating procedures. The only success obtained has been in association with U.S. companies. However, as far as the platform elements are concerned (such as structure, thermal control, propulsion, power and data handling), basic capabilities exist in Europe and can sustain technical comparison with products from other parts of the world. This is also the case for navigation systems, meteorological instruments and surveillance sensors satellites (SPOT).

The prime weakness of European companies lies in the area of advanced sensors for aspects of surveillance and early warning. European manufacturers also have difficulties in producing price and performance competitive final products, especially in the satellite communications space and ground sectors. In comparison, U.S. systems benefit from a much larger scale of U.S. space activities, both military and civilian.

Accidents that occurred in the past have resulted in buyers modifying their specifications. This, in turn, has resulted in an increase in satellite costs and complexity. This trend has intensified competition in an already active satellite manufacturer's market. The availability of satellites is presently greater than the demand, and a major market restructuring is expected before the next decade.

The expected restructuring could be particularly significant in Europe. There are perhaps five potential prime contractors in the U.S. satellite business. Thus, using a comparative analysis, the number of European satellite manufacturers could decrease from six to two, or even to one. Some rationalization is necessary, but none of the major nations is willing to see its ESA contribution being used to strengthen the industrial capability of another. The economies of scale necessary to remain competitive will, however, force companies to collaborate. Effects of this restructuring are already evident. British Aerospace Systems is reinforcing ties it has already established with its partners, such as the French company Matra.

The relatively little explicitly European military space activity is largely confined to communications, such as the U.K. Skynet program, the French independent military communications capability and a possible expansion of SPOT to aspects of military reconnaissance. The IEPG list of military products does not include space systems or equipment.

1.2 Defence Industry

a) Canadian Defence Industry

The Canadian defence industry is made up of companies that produce both civilian and military products, although their activities are more civilian in nature. The companies in the Canadian defence industrial base are characterized by a pronounced degree of specialization, and very little vertical integration. The principal military activities are:

- assembling and integrating systems on particular domestic mega-projects (ADATS for Oerlikon and CPF for PARAMAX);

- supplying subsystems and components and manufacturing on a subcontracting basis for U.S. prime contractors and to a lesser extent to the U.S. Department of Defense (through the access provided by the Defence Development and Defence Sharing Arrangements [DD/DPSA]);

- providing repair, overhaul and life cycle support of defence equipment and systems for the Canadian Department of National Defence; and

- manufacturing systems and subsystems for which Canadian companies enjoy a worldwide reputation -- in other words, in technological niches where world-class capabilities are recognized (flight simulators, avionics, gas turbine engines, naval helicopter handling systems and military vehicles).[39]

Canadian defence industry production occurs in a number of different industries, of which the main ones are aerospace, electronics, marine, vehicles and munitions. The industry's main exports fall into the categories of aerospace and electronics. Between 1983 and 1987, Canadian defence industry exports to European countries (mostly European NATO countries) totalled approximately $1.2 billion. In comparison, U.S. industry exported US$26.7 billion worth of goods to European NATO countries. Canadian imports totalled $0.5 billion (compared with US$7.8 billion for its American counterpart).[39] For the same period, Canadian defence industry exports to the U.S. represented about US$5 billion and its imports were about US$6.2 billion. This reflects the importance of the U.S. to Canadian industry.

The Canadian defence production is highly integrated with that of the U.S. defence industry. This degree of integration is explained by the Canada-U.S. DD/DPSA agreements.[40] Since the implementation of these agreements, efforts to increase this integration have been reinforced, especially since 1987. Canadian policy, in fact, is quite clear about promoting stronger continental co-operation.

The Canadian defence industry's trade with individual European countries is handled under research, development and production agreements, and sales are usually limited to filling specific niches where the Canadian industry has a unique capability. The leading EC markets for the Canadian defence equipment industry are the Federal Republic of Germany, the United Kingdom and the Netherlands. It is with these countries that the majority of Canadian-European corporate links, in the form of ownership of subsidiaries, partnership consortia or joint ventures, are found.

For the Canadian defence industry, specialization has also been the key factor of success. Indal Technologies is the world's leading supplier of helicopter recovery systems; Oerlikon Aerospace provides overall international project management of the Canadian Low Level Air Defence (LLAD) contract; Litton Systems Canada is the world's largest manufacturer of inertial navigation systems and a leader in flat panel cockpit displays; and Canadair is a leader in the manufacture of remotely piloted vehicles. Supersonic combat aircraft design and manufacture have not existed in Canada since the cancellation of the Arrow.

Canadian Defence Electronics

The subject of the Canadian military aerospace industry having been addressed in section 1.1 a), this section discusses the other Canadian defence sub-industry that has a strong export component: electronics.

In Canada, the defence electronics industry specializes in the design, manufacture and maintenance of radio and communication material, radars for surveillance and navigation, air traffic control systems, acoustic and infrared sensors, computers for navigation and tactical fire control, electronic warfare and military communications systems, signal processors and display units, hybrid microcircuit and various electronic components, as well as auxiliary software.[41]

The industry sells to the military, government agencies or commercial airlines and to prime contractors for inclusion in larger defence systems.

Like the aerospace industry, the Canadian defence electronics industry is highly export oriented and is closely integrated with foreign primary contractors, particularly in the U.S., although NATO markets are also served. Exports account for 80 per cent of the industry total shipments, and 81 per cent of these exports are intended for the U.S. market,[42] primarily as a result of the Canada-United States DD/DPSA agreements.[43]

The industry is concentrated primarily in Ontario and Quebec (92 per cent of production), with approximately 150 companies in the industry. The 12 major companies account for about 70 per cent of total industry revenues. The major Canadian defence electronics companies are Litton Systems Canada, CAE Electronics, Canadian Marconi Company, Unysis Canada, Raytheon Canada, Computing Devices Company, ITT Canon Canada, Bendix-Avelex, Garrett Canada, Rockwell International of Canada, MacDonald Dettwiler and Associates (MDA) and Leigh Instruments (now owned by Spar).

Unlike most other countries, Canada has a high incidence of foreign ownership within the industry, particularly American ownership. This is explained in part by the close integration of the U.S. and Canadian markets; that is, the DD/DPSA agreements calling for a Canadian content is seen as a background or indirect factor that influences U.S. companies in the decision to establish themselves in Canada. Among the 12 major Canadian defence electronics companies, eight are American owned, two are British owned, and only two are Canadian owned. Smaller companies are largely Canadian owned.[44] The U.S.-owned companies are the biggest investors in R & D and capital expansion. In some cases, the U.S. parent companies provide their Canadian subsidiaries with technology as a result of worldwide product mandates, an essential element to succeed in the U.S. and other international markets.

The Canadian defence electronic industry is in a favourable position internationally in market niches such as simulators, radar, telecommunication, navigation systems and instrumentation, and computer software. In contrast, it has limited capabilities in performing large-scale systems-integration activities. The main EC defence electronic companies competing internationally with Canadian companies are Thorn EMI from the United Kingdom, Thomson-CFS from France and Standard Electric Lorenz from the Federal Republic of Germany. Examples of Canadian-European corporate links, through ownership of subsidiaries, partnership consortia or joint venture, are as follows:

- *U.K. defence electronics companies with Canadian ownership*

MDA (UK)	MDA
Caltronics	Canadian Astronautics Ltd. (CAL)

- *Canadian companies with British ownership*

Canadian Marconi Company	General Electric Co. PLC

- *German companies with Canadian ownership*

CAE Electronics GmbH	CAE Electronics Ltd.
Garrett GmbH	Allied Signals Aerospace Canada

In the U.S. market, the Canadian defence electronic industry, like the aerospace industry, will have to face U.S. defence budget cuts, non-tariff barriers (such as foreign government defence department regulations), restrictions (such as security and technology transfers) and intense competition. The conditions in the U.S., combined with the evolving environment, the necessity to develop new technologies and products and an expected industry consolidation, should prompt Canadian companies to look increasingly to European and other procurement markets, while conserving and strengthening their link with U.S. industry.

In summary, the Canadian defence electronic industry concentrates on specific technology niches, which benefits its international competitiveness. However, this lack of diversification also makes it vulnerable to fluctuations in the demand for defence products. It is, therefore, essential that the Canadian industry take a more active role in its participation in R & D joint projects, not only in the United States but also in Europe, especially

within NATO programs. For instance, under the ongoing conventional weapons disarmament accord in Europe, Canada could exploit its skills in such areas as verification, surveillance and logistics to play an active role. Increased participation will not only allow companies to reduce the impact of increasing costs, but will also reduce the problems related to the design, manufacturing and marketing of new products, which form the main obstacles to Canadian defence electronic industry development.

The Canadian defence industry cannot ignore the changes that are occurring in this period of transition to an increasingly competitive global economy. Europe 1992 is an important part of this movement. Canadian companies should realize, consequently, that while there will be a cost (related to time and distance) associated with doing business in Europe, there will also be a cost associated with inaction.

b) European Defence Industry

The defence expenditures of European NATO countries are a little less than half the amount of the U.S. The size of the market, therefore, suggests that the dominant players in the world defence market should emerge from the EC. Although many European companies are competing on world markets, national policies have prevented the realization of the potential that a European defence industry could be expected to have.

The EC has realized that to improve its competitiveness on world markets, the restructuring of its defence industry must continue. The favouring of domestic suppliers had created a fragmentation of the industry, high manufacturing costs, overcapacity and an absence of standardized equipment. A partial reflection of Europe's competitive weakness can be found in the fact that European manufacturers, along with their U.S. counterparts, are now relying heavily on Japanese components and are starting to purchase Japanese subsystems. Nevertheless, European companies are active competitors in the production of a wide range of goods, such as aeronautic, automotive, naval construction, electronic, telecommunication, and other high technology products.

In recent years, the defence industry has become structured more globally, a process the EC has not escaped. This new trend should bring about a reduction in the number of large armament contractors. Until recently, however, this industry was expanding in Europe.

During the last 10 years, large NATO programs in Europe, such as the introduction of new technologies in armaments stationed in Europe, have benefited European companies and have encouraged the development of a defence industry. These programs, combined with specific government programs and the efforts of groups such as the Eurogroup and the IEPG, have facilitated an increase in intra-EC collaboration and narrowed the gap between the European and American defence industries. The new European military complex is thus in a position to occupy a larger place not only in third countries, but also in the U.S., where the government is expected to begin calling for more competition for its contracts. A good example of the European penetration of the U.S. market is the previously mentioned sale of Écureuil helicopters by Aérospatiale to the U.S. Coast Guard.

In spite of the trend toward increased integration, some resistance to the movement in the EC still exists, as shown by a study released by the IEPG. With some exceptions of satisfactory collaboration, the European defence industry is still handicapped by the fragmented nature of the European effort in all stages in the procurement process.[45] Each country's ministry of defence tends to do business with its own national industry. Hence, requirements are too closely related to narrow national requirements, procedures vary considerably among European countries, and the existence of national technical standards (both military and civil) hampers collaboration between industrial European partners.[46] This situation is paralleled by differences in legal, accounting and business procedures.

The European defence industry is similar to Canada's insofar as it is primarily composed of dual military/civilian "high tech" companies. Approximately 60 per cent of the EC aerospace industry output is defence related. (This figure is between 60 and 70 per cent in the U.S. and about 80 per cent in Japan.) In contrast to Canada, the EC has helped European companies in the aerospace industry by providing support for R & D. The European industry differs from the U.S.

industry in that the EC companies are involved in both civilian and military production, while U.S. companies are involved in either one or the other but not both.

EC companies have capabilities in the production of military vehicles such as armoured and other vehicles, and, with the exception of emerging technologies (advent of new potential in the robotics field), there is no technology threat from the U.S. However, the production of armoured vehicles is highly fragmented. Main battle tanks are produced by France, the Federal Republic of Germany, Italy, Spain and the U.K.. This has led to duplication of effort and facilities, small production runs and high unit costs. Furthermore, EC military vehicle companies face intense competition in the export markets. For instance, they compete on the armoured vehicles market not only with the companies from the U.S. but also from Brazil and Sweden.

The European technology base in conventional weapons, conventional munitions and powders, explosives and warheads is quite competitive.[47] National governments look on the capability to produce munitions and conventional weapons as being necessary to assure national defence capability.

Areas of potential weakness for Europe are the developing fields of new-generation guided weapons,[48] autonomous weapons and the so-called "smart" weapons (particularly in sensors and in computation capability). European weakness is also created the development and production of national weapon systems that are directly competitive and thus lead to a fragmented rather than a united EC in this area.

In the defence ships[49] and submarines[50] industry, Europe is fully competitive and has a strong record of innovations, although capabilities vary from country to country. However, there is an overcapacity in the ship-building industry worldwide because of an acute scarcity of civil orders and because of the competitiveness of producing nations such as the Republic of Korea, Japan and Taiwan.

Going into the 1990s, the European defence industry will be affected by the changing nature of worldwide markets in the defence industry. This will be characterized by attempts to develop next-generation equipment in relation with the industry's access to other markets or increased share of the global market. The main areas of growth by the year 2000 will come from dual or mixed nature industries.

Purchase of goods and services of European defence companies from external suppliers are roughly estimated at between 40 and 50 per cent of their production value. For the most part, these supplies continue to be purchased from specialized national manufacturers.

In summary, the European defence industry restructuring is designed to achieve increased international competitiveness, a goal that can only be attained at the expense of jobs losses. Expected growth in the civilian aerospace industry will probably not compensate for this decrease since this sub-industry represents only 30 per cent of the industry total sales in Europe and since an increase in competitiveness is targeted for this sector as well.

Concerns of European companies with respect to their ability to compete focus on the critical electronics industry, in which Europe is lagging perhaps several years behind the U.S. Thus, the EC considers this a critical industry. In the field of electronics, more than in any other technological area (with the possible exception of materials), there is a strong interaction between military and the civilian oriented innovations, making the defence electronics industry even more important for the EC.

European Defence Electronics

The European electronics industry specializes in micro-electronics, opto-electronics, millimetric waves sensors, acoustic systems, radars, communications, navigational systems and integrated systems.[51]

The defence electronics industry enjoys a solid technological base,[52] especially in the fields of battlefield communications, infrared surveillance, weapons guidance (weapons-aiming) systems technology applicable to field and weapon platform use, some radar systems, active and passive sonar systems and associated data processing and display

techniques, inertial navigation technology, low power lasers for ranging, target making, EW, jammers, some missiles guidance systems, and millimetric wave sensors.

The weakness of the European defence electronics industry lies in the lag it has in micro-electronics, particularly in: (i) the development of advanced high-speed multi-current chips and Application Specific Integrated Circuits (ASIC) for military use, (ii) some aspects of advanced opto-electronics such as multi-element arrays, (iii) radar solid state antennae arrays and (iv) harnessing of computer software and hardware to systems. As a result of the rapid pace of development and the speed with which the U.S. and Japan can move from development to marketable systems, micro-electronics technology is viewed as the most critical area and a source of potential threat.

The anticipation of diminishing opportunities in the defence field has induced changes in the industry. Subsidiaries of Plessey (U.K.) have gone to Siemens (Federal Republic of Germany), and the submarine and avionic division of Plessey have gone to the General Electric Corporation (GEC). The bulk of Philips' (Netherlands) interests have been bought by Thomson-CSF, a French state-owned group. Philips in Sweden was bought out by Bofors. The acquisition of Messerschmitt-Bolkow-Blohm (MBB), the principal German aerospace and missile company, was effected by Daimler-Benz, which held a significant share of the country's military electronics.

For the most part, this consolidation has taken place within the borders of the countries concerned. However, transnational groupings are under way. British Aerospace and Thomson-CSF have paved the way by finalizing the merger of their radio-controlled weapons activities to form Eurodynamics. BAe has agreed for the first time to use a French guidance system for air-to-air weapons, and GEC-Marconi has concluded a similar agreement with Thomson-CSF's competitor, Electronique Serge Dassault.[33] The motivation behind these groupings is to ensure possession of a large range of important technologies in order to be in an advantageous position vis-a-vis weapons projects, and to provide the necessary funds to finance ever-increasing R & D costs. For example, BAe has placed great importance on Merlin, the new anti-tank "intelligent" system, but has done so without government aid. Individually, European countries have realized that they do not represent markets of sufficient importance to justify the R & D expenditures necessary to enable manufacturers to compete with U.S. companies. Thus, concentration and collaboration seem inevitable.

France is the only European country with a defence sector similar to that of the U.K.; that is, it is tightly controlled by the state and open to co-operation with other partners. This attitude inspired the 12-nation EUCLID project to collaborate on military research to establish standards of excellence. The countries involved in the project were awarded pilot projects in priority sectors (the U.K. is working on electromagnetic weapons) in the hope of better using government research funds. EUCLID relies on various government funds and does not have EC funding as the French had hoped. Consequently, the industry must bear part of the burden. This program, therefore, differs from the EUREKA program, which provides support to companies that present projects to this end.

1.3 Urban and Inter-city Transport Industry

a) Canadian Urban and Inter-City Transport Industry

Canadian Mass Transit Industry

Two manufacturers of passenger railway rolling stock dominate the Canadian industry: Bombardier Inc. (Quebec) and Urban Transportation Development Corporation (UTDC) (Ontario), a subsidiary of Lavalin Inc. Both companies produce mass transit and commuter cars and can design complete systems. Some 250 other Canadian manufacturers specialize in the assembly and sub-assembly of vehicles and propulsion systems, and supply other components of electrical and mechanical equipment. Although the Canadian mass transit industry suffers from having a small market in comparison to its European competitors, this problem is partially resolved by proximity to the U.S. market.

The Canadian mass transit industry is strongly export oriented; Canada is one of the six biggest exporters of the industry. The U.S. (with about 19 per cent of the world market) is the world's leading exporter, followed by France, the Federal Republic of Germany, Japan, Canada and the U.K. (with about 8 per cent each). In 1986, estimated vehicle sales from Canadian industry totalled $697 million.[54] That same year, 89 per cent of sales were exports destined to the U.S. The Canadian production of railway rolling stock is estimated to be equivalent to 3 per cent of overall European production.[55]

In the EC, non-tariff barriers such as government procurement policies, represent a major barrier to Canadian exports (except for Canadian companies established in the EC). In fact, these barriers have so far excluded Canada from the European market. In the U.S., the tightening of the "Buy America" requirements might compromise the long-term future of the Canadian mass transit industry. This would create problems for Canadian companies such as UTDC, which has done very well in the U.S. market, exporting bi-level cars such as those used by GO transit.

Bombardier, by acquiring BN in Belgium,[56] and UTDC by integrating with Lavalin International,[57] are now able to market in the EC. In Europe, these two Canadian manufacturers face international competitors including important companies in the EC market such as MAN (Federal Republic of Germany), GEC-Alsthom (France) and ASEA Brown Boveri. They are competitive in terms of both product and price and have a good reputation for quality and reliability.

In the United States, the reduced availability of U.S. federal funding, combined with the high costs of subway systems should encourage demand for lighter systems. Therefore, Advanced Light Rapid Transit (ALRT) and Canadian Light Rail Vehicle (CLRV) are favoured Canadian sectors.

In summary, the range of available products, price and reputation for quality and reliability enable the Canadian industry to be competitive. However, the insufficiency of domestic demand, the failure to penetrate offshore markets, the implementation of stricter protectionist measures in the U.S., the arrival of new competitors on the market (for example, Japan, Brazil, South Korea and Australia) and the lack of export financing constitute factors that may jeopardize the long-term viability of the Canadian mass transit industry.

Canadian Bus Industry

The Canadian bus industry is competitive within the North American market and has developed a lead in certain niche areas where small-volume orders are required and where production efficiencies are not important. This industry includes both urban transit and inter-city bus manufacturers. In the inter-city sub-industry, Canadian producers have an edge over the European inter-city coach technology because European technology is less cost effective for the North American market.[58]

The demand for Canadian buses is met almost completely by domestic manufacturers, and more than half of the Canadian industry shipments is exported to the U.S. In contrast, very little trade exists between Canada and the EC in the buses sub-industry. With the exception of a recent contract for 22 articulated buses for the South Shore of Montreal Transit Commission supplied by the Belgian company Van Hool s.a., there is practically no import of finished buses from the EC.[59] Similarly, from the point of view of exporting, sales to EC members states face not only tariffs of 20 per cent but also considerable non-tariff barriers. Non-tariff barriers erected by the EC member states include restrictive procurement policies and specifications, which, together with strong indigenous industrial capacity, have in effect closed this market to Canadian companies.

There are four bus manufacturers and five plants in Canada: Motor Coach Industries (MCI) (Winnipeg, Manitoba), an American company, and Prévost Car (Ste-Claire, Québec), which operate in the inter-city buses sub-industry, and Les autobus MCI (St-Eustache, Québec), the Dutch-owned company New Flyer Industries (Winnipeg, Manitoba) and Ontario Bus Industries (OBI) (Mississauga, Ontario), which operate in the sub-industry of urban buses.

The inter-city sub-industry represents slightly more than 50 per cent of the industry's total bus shipments, and 75 to 85 per cent of sales are destined for the U.S. The inter-city sub-industry sells mainly to privately owned carriers, to charter

carriers and, to a lesser extent, to publicly funded operators for commuter services. The urban sub-industry sells primarily to publicly funded transit operators in both Canada and the U.S.

Like the mass transit equipment industry, the bus manufacturing industry relies heavily on the American market, where conditions have become increasingly restrictive. In addition, various factors make Canadian manufacturers more and more vulnerable. These factors include: (i) overcapacity, (ii) the depressed demand for new inter-city and urban buses in the U.S. market, (iii) intensified competition, such as the increased competition from commuter airlines for the inter-city sub-sector and (iv) competition from manufacturers entering the market, such as new European entrants (for example, the now well-known European manufacturers Neoplan, Setra and Bova).[60]

The Canadian urban bus sub-industry has down-sized its plant capacity, and continued rationalization is expected. In fact, establishing operations in the U.S.,[61] linking up with joint-venture partners and establishing market niche strategies may prove to become more and more important to remain competitive on the market. Thus far, however, the Canadian inter-city bus sub-industry has been able to maintain its share of the market and remain competitive, and is well positioned to compete in the deregulated environment.

For Canadian manufacturers (with the exception of Bombardier, which has major investment in the EC), Europe is a highly protected and difficult market to penetrate. However, there are a number of examples of Canadian companies finding niche markets in the EC. For instance, Vapor Canada sold 800 door systems to London Underground; Giro and Teleride Sage have both sold bus scheduling systems and software to a number of transit properties in Europe; and Pylon Electronic Development Company Ltd. anticipates entering the European market shortly with the sale of transit curtain scrolling systems to a U.K. transit property.

b) European Urban and Inter-city Transport Industry

European Mass Transit Industry

Generally, the mass transit equipment industry is characterized by a high level of protectionism in industrialized countries and intense competition in developing countries.

On the whole, the EC is the largest manufacturer of mass transit equipment in the world and, in general, offers a high quality product. With the exception of Greece, Ireland, Luxembourg and the Netherlands, all EC countries have their own suppliers, principally AEG, Duewag and MAN (Federal Republic of Germany), Alsthom Atlantic (France), Metro Cammel (the U.K.) and Breda (Italy).[62]

Over the few last years, many firms have been merged into national groups. Two international groups have also been created in Europe, both involving firms from outside the Community. These are Bombardier (Canada) and BN (Belgium), and ASEA (Sweden) and BBC (Switzerland). Within the Community in 1989 (including both big groups and their many subsidiaries), there were 17 manufacturers (electrical and mechanical) of locomotives, 44 manufacturers of coaches and goods wagons, and 24 manufacturers active in both of the above industries.

In 1987, sales in this European industry reached approximately $4 billion, of which close to 20 per cent were destined for exports.[63] Three Community member states, France, the Federal Republic of Germany and the U.K., were among the six biggest exporters, each having about 8 per cent of the world market, making for a total of approximately 24 per cent of the world market.

The national railway networks are controlled by single national operators. Highly dependent on its national markets, the Community rail transportation industry operates at about 50 per cent of its capacity.[64] Faced with a multiplicity of types of rolling stock materials and aggravated by a low level of intra-EC trade, it is difficult for the European industry to achieve optimal production runs.[65]

The railways' share of the European transport market has decreased in favour of other modes of transport such as air transport. From the late 1970s to 1987, passenger traffic share has decreased from 8.9 per cent to 7.6 per cent and freight traffic share has decreased from 19.4 to 14.7 per cent. In terms

of rail transport (passenger and freight), the Federal Republic of Germany, France and the U.K. form a central block, and, as the rail system develops further, these three countries will form the core of the European network.

Several factors may allow European rail to recapture the market share in the 1990s. A possible expansion of rail networks could be favoured by environmental considerations about moving from road to rail, concerns about current overcrowding on the roads and in the air and concerns about air pollution. The light railway networks currently under construction in urban areas across Europe represent a solution to these problems. Moreover, the success of the Paris-Lyon TGV has demonstrated the potential market shares that high speed railway services may recapture from air and road transport. Extensions of high speed railway networks are planned in France (2300 km), the Federal Republic of Germany (800 km) and Italy (2200 km). The Community of European Railways (CER)[66] has proposed a high speed rail network linking cities in France, the Federal Republic of Germany, Spain, Portugal, Italy, Switzerland and Belgium, as well as the upgrading of existing tracks to allow higher speed. This will complete a high speed rail network across all Community countries.

Electrification of European main lines will continue in several member states throughout the 1990s. In Italy, the Netherlands and Belgium, more than 50 per cent of the network has already been electrified, in the U.K. only 25 per cent and in Denmark only 10 per cent.

In the freight market, change will include the introduction of swap body units that will render road and rail increasingly compatible and will reduce transit times. This could provide an opportunity to recapture market shares from road haulage.

The opening up of government procurement markets to all EC companies in the transport sector (works and supplies) should happen very progressively. For instance, the national railway network is still closely tied to domestic industries. However, industry concentration is already in progress in France and is beginning in Italy, Spain and the U.K. Further rationalization by European companies is inevitable, and it is expected that the merged firms will continue to be favoured by national governments.

Small and medium size companies are expected either to disappear or to be acquired in the medium term. Furthermore, the European industry is expected to be dominated by three or four large multidisciplinary groups (ABB, Alsthom and Siemens among them), which will be able to face Japanese and American competitors on foreign markets.

European Bus Industry

In the Community, more than 300 entities (most of them state or local government owned) operate fleets of more than 50 inter-city and urban buses. In some EC member states, for instance Spain, France, Ireland and the U.K.[67], exclusive rights to operate inter-city and urban bus transportation networks are given to private companies. The industry is further characterized by the subjection of purchases to close scrutiny by government authorities and a general tendency to buy from domestic suppliers. The exception to these observations is the inter-city and urban bus transportation services market in Great Britain (excluding London).

The fragmentation of production in this industry is evidenced by the fact that each Community country has one or several bus domestic suppliers involved in the manufacture of either engines, frames or coachwork. A number of these are government owned. Each individual EC member state tends to impose its own security and operating standards. This accentuates the differences in national standards and creates an additional barrier to intra-EC trade. Long-term relationships between suppliers and operators have further contributed to reinforcing the fragmentation of the markets. However, some improvements have been achieved on road vehicles weights and dimensions, with the agreement at the Community level.

In spite of a fragmented industry, Europeans have demonstrated an ability to respond to competitive pressure. The ability of certain EC companies to co-operate on extra-EC markets shows that increased co-operation is feasible. Furthermore, faced with dwindling European demand and confronted with overcapacity, a few European

manufacturers have turned to the U.S. to liquidate their surplus; some have chosen to invest directly in the U.S. (for example, Neoplan). Other European builders are withdrawing from the U.S. market (for example, Volvo and Renault).

In addition to the necessity of contending with a demand decrease, Community manufacturers are being confronted with greater intensity of competition from European Free Trade Association (EFTA) countries and Eastern European manufacturers. One can therefore expect that the European industry will look more and more to the American market to liquidate its excess of production.

2. EUROPE 1992: CHANGES AND IMPLICATIONS FOR CANADIAN INDUSTRY

2.1 Market Conditions

The market conditions in the three industries examined in this report are projected to vary considerably. For instance, in the civil commercial aerospace industry, expected Community air traffic deregulation and continued steady economic growth as wider liberalization of EC trade and commerce takes place should bring about an increase in demand. This will stimulate the number of civil commercial aircraft orders in the 1990s. Throughout the next 15 years, the world civil commercial aircraft market is estimated to amount to a little over US$250 billion. The Community share of this market should represent about 20 per cent. Aircraft, engines and spare parts should constitute between 35 per cent and 50 per cent of Community company purchases.[68]

International co-operation is already very strong in this industry as a result of the enormous costs involved in the construction of an aircraft. European countries cannot individually shoulder development in this industry. This fact, together with greater access to, and transparency of, government procurement, will induce a further restructuring of the European aerospace industry and lead to a higher level of concentration. Not only will more attention be paid to the realization of European joint programs, but also large aerospace companies will emerge. The acquisition of MBB by Daimler-Benz is a good example of this trend. Last year, Daimler-Benz regrouped AEG's electronics interests with the aerospace interests of Dornier and MTU to form the subsidiary Deutsche Aerospace. Deutsche Aerospace has thus become the largest player in the European industry.

In brief, the Canadian civil aerospace sub-industry can look forward to growth in European air transport demand. In theory, the regional and business aircraft transportation field, in particular, represents an excellent opportunity for Canadian companies.[69] These significant changes notwithstanding, the effects of the completion of the Single Market in 1992 will have a greater impact on military procurement of aircraft, which has previously been characterized by strict rules regarding local content.

With regard to the defence industry, the predictable military budget cutbacks of NATO countries and the reduction of conventional East-West forces will create a narrowing of the defence market and a consequent intensification of competition, which will favour the more powerful companies. It may also cause a refocusing of military technologies toward surveillance (remote sensing) C3 and intelligence.

With reduced military budgets, it can be expected that Community members will look for ways to reduce the costs of operating and maintaining equipment, as well as ways to prolong the operational lifespan of existing equipment. It is also likely that many acquisition programs will be downgraded or even abandoned. This implies that Canada has good opportunities now; however, this is questionable, since most Canadian companies find it difficult to penetrate the European market. In such a context, will remaining opportunities (such as surveillance systems, simulators, component parts and replacement subsystems) remain open to the Canadian industry? Will the industry be able to maintain its market share?

With regard to the urban and inter-city transport industry, in particular the subindustry of mass transit equipment and material, the 1990s market should be characterized by a slight increase in demand for merchandise transport services[70] and equipment (introduction of swap body units) and an increase in passenger transport services.[71]

Production for both domestic and export markets should pick up in the 1990s, mainly as a result of high speed rolling stock gradually going into service in several European countries. Expenditures will attempt to address the need for modernization and will be largely devoted to the purchase of material destined for the planned European high speed network (TGV).[72] Some projects are in the

planning stage, for example, the Alpine rail passes linking Northern Italy to the main central European rail system in Switzerland and Austria, and similar rail routes through the Pyrenees to improve Franco-Spanish links. Some are beyond the planning stage, as in the case of new high speed railway routes in France and the Federal Republic of Germany.

In the sub-industry of inter-city and urban transport material, the critical financial situation in which many entities responsible for the administration of inter-city and urban buses fleets share, does not allow them to consider new investments. These organizations will have to maintain their capital spending at a minimum level, to ensure essential replacement requirements.[73]

On the whole, the European rail and urban transit markets will remain highly protected and difficult for Canadian companies to penetrate.[74] However, the European mass transit industry will offer some opportunities for Canadian companies capable of finding niche markets. Some have already succeeded in selling to the U.K., one of the few member states (along with the Federal Republic of Germany and France) that is already purchasing from suppliers outside the Community.

2.2 Opening of Public Procurement Markets

It is still difficult to measure with precision the impact of the opening of the public procurement markets on these industries. Specific measures regarding these industries have only very recently been approved.

The opening of public procurement markets to intra-Community competition represents an essential element of the intention to create a European market by 1992. Liberalization of exchanges will then apply to an extensive range of public market contracts. However, it is conceivable that in the medium term, non-EC firms may not benefit significantly from a system that maintains a strong preference in favour of EC-based companies.[75]

The economic importance of the public and semi-public sectors' procurement of goods and services (and the impact they have on the completion of a Single European Market) becomes evident when one considers that public purchases are evaluated on average at 9 per cent of GDP (15 per cent if government enterprises are included). Furthermore, the impact of public purchases in some sectors is even more significant when one considers that some related, important production sectors, such as aerospace manufacturing, armaments or the machinery and equipment industry, occupy a leading position and have the state as their largest single source of contracts. The Community has, therefore, set a goal of opening public procurement markets to Community (but not worldwide) competition and also of establishing an internal market in the public sector.

The impact of government procurement is the greatest in those fields of activity in which the state has granted special or exclusive rights to government enterprises. These sectors include transport, production, telecommunications and the distribution and transport of hydro and energy services. An EC official who participated in the development of the new rules governing public contracts emphasized that they are "distinct from other single market procedures, but born of a similar philosophy, with emphasis on flexibility and adaptability." The measures aim to set in place a common discipline ensuring market transparency with regard to supplies, as well as to open up national procurement markets to intra-EC competition only.

In the development of these new directives on sectors that, up until now, were excluded (hydro, energy, transport and telecommunications), the Community incorporated the concept of Community preference, a principle that was absent from existing general directives on supply and services.

During an internal market's Council in February 1990, the member states opted to establish a compulsory preferential mechanism, which would apply even when a Community offer is 3 per cent above a non-Community offer. This principle is complemented by the concept of local content. This means that the entity calling for tenders will have discretionary powers to reject any offer when "manufactured products or services supplied outside of the Community, or a combination of the two, represent half of the offer's value." It is therefore expected that, to be retained, non-Community offers

will have to be under Community tenders, by a margin superior to 3 per cent.

Finally, the directive establishes that these measures will be null and void for third countries with which the Community has signed bilateral and multilateral reciprocity agreements. For the time being, no agreements of this kind have been signed between the Community and third countries. It is evident that these discussions will have to be held in the context of the General Agreement on Tariffs and Trade (GATT) and in view of upcoming negotiations on public markets. It must be noted that Canada has set a preference margin of 6 per cent.

The principal clients of the commercial aerospace industry are airline companies. Each member state has its own national company. Six Community airline companies are listed among the 16 largest in the world: British Airways (United Kingdom), Air France (France), Lufthansa (Federal Republic of Germany), KLM (the Netherlands), Iberia (Spain) and Alitalia (Italy).

For the moment, airline companies are excluded from the measures regulating the opening of public procurement markets. GATT and Organization for Economic Co-operation and Development (OECD) agreements, the limited number of suppliers throughout the world and the existence of international co-operation agreements concerning repair and maintenance of aircraft limit the possibilities for state intervention (except through state support to national companies, for example, Aérospatiale) in these markets. For these reasons, the Commission has deemed them to be sufficiently transparent and has not seen fit to extend the Community public procurement market regulations to airline companies.

As a result, Canadian exports in this sector should not be affected by 1992. However, should the Commission later decide to include airline companies in its proposal on the opening of public markets, Canadian companies that sell either directly or indirectly to these companies will have to pay particular attention to Article 24 of Directive (89) 380.

Although the European Community has no direct involvement in defence industry matters, the industrial restructuring likely to follow the creation of a Single European Market is bound to have some negative effect on the Canadian defence industry. In this industry, only the materials public markets (for example, clothing, rations and medical supplies) fall under the Community's jurisdiction and are subject to regulations defined in the March 22, 1988 88/295 directive.[76] Among other measures, this directive defines the limits for recourse concerning mutual agreement contracts and requires prior publication for upcoming contracts. The impact of this directive will be minimal, since purchases covered by it represent only a small percentage of defence markets.

As far as defence equipment is concerned, Article 223 of the Treaty of Rome grants exclusive jurisdiction to member states. This jurisdiction has led the Community's member states systematically to favour domestic suppliers. Such an attitude has, as mentioned, contributed to the industry's fragmentation, high costs, overcapacity and lack of equipment standardization.

Aware of these problems and of the necessity to develop a "European" identity with regard to security matters, European Community member states, dubbed "The High Contracting Parties," have adopted Article 30(6) of the Single European Act. By virtue of this article, the Commission endows itself with the right to oversee the preservation of technological and industrial capabilities necessary for Community security and requires member states to better co-ordinate security, including its political and economic aspects.

Of the measures aimed at liberalizing defence public procurement markets, the most important measure is probably the grouping of European NATO member countries in February 1976 into the Independent European Program Group (IEPG), which comprises the European members of the Atlantic Alliance (with the exception of Iceland). Besides the creation of the IEPG, however, there are other examples of attempts to strengthen European co-operation in defence matters. Two other separate bodies -- the Western European Union (WEU)[77] and the Eurogroup[78] -- are dedicated to promoting defence co-operation among their respective member states. The EC Commission, under its new mandate, is charged with promoting industrial and technological

development in the interests of the security of the Community. Although not a Eurogroup member, Canada (as well as the U.S.) participates in some Eurogroup activities and is still active in the Euro-NATO Joint Jet Pilot Training Program.

Of all the previously mentioned groups, the IEPG is the most dynamic. The IEPG is, however, outside the formal structure of NATO and overlaps the responsibility of the Conference of National Armaments Directors (CNAD), minus Canada and the United States, as well as Eurogroup. The way the IEPG operates provides both the political and the technical will to translate armaments collaboration objectives into realistic and feasible co-operative programs.[79] IEPG member countries have agreed on the implementation of certain principles to establish a base for the defence common market.

The cornerstone of developing a common defence market is the opening of public procurement markets in IEPG countries that are EC Member states. It is therefore expected that measures aimed at increasing market transparency will be implemented. These measures include the systematic publication of invitations to tender originating from member countries, the establishment of a registry in each country for all potential suppliers who wish to tender on eventual offers and the harmonization of invitations to tender and of tendering procedures.

It is unlikely, however, that common measures concerning tendering procedures will be adopted for several years, considering the complexity of the task at hand and the particularly sensitive character of the defence industry. Registration of certain companies as potential suppliers in another member country should be a relatively simple procedure given the attempts at harmonization of tendering procedures; however, this has proven more complex then expected because some countries have much more restrictive requirements than others.

Included in the discussions on how to implement a common defence market, there is also discussion of "juste retour" (balanced trade), a concept that is central to the creation of a single defence market. In this concept, the principle of economic compensation takes on a new form, which is perhaps not likely to promote transatlantic co-operation in the defence sector. The idea of "juste retour" would constitute an integral element of the principle of fair distribution of development programs between industries of the various IEPG member countries.

The idea is to attempt to reach a balance of equilateral exchanges between each member country, and, if necessary, to compensate for the imbalances by encouraging companies, perhaps by means of financial aid, to participate in contract fulfilment with the main tenderer. This approach requires the development of a mechanism that allows a quantitative analysis of exchanges between IEPG member countries on a comparable basis and the establishment of both an acceptable level of disequilibrium and a time frame within which to correct this imbalance. It must be noted, however, that aside from this method correcting the imbalances, certain IEPG member countries would perhaps be more in favour of an interventionist approach, limiting competition with IEPG countries with which they would have otherwise positive exchanges. A clause allowing dispensation of this principle where matters of national interests are concerned is also expected.

Whatever the case, the principle of "juste retour" would promote co-operation between companies from IEPG member countries, and one could question whether it would not therefore make it difficult to increase exchanges between European and Canadian companies.

In addition to measures aimed at harmonizing offer and tendering procedures, the IEPG plans to establish a system of information exchange with regard to technology and expertise, to increase the possibilities of multinational R & D collaboration and to rationalize the expenses. The implementation of research and technological programs are also planned.

Steps taken by the IEPG concerning the European defence market regarding the provision of information have been the publication of an official defence markets bulletin and the creation of agencies within each member countries to disseminate the information and oversee registration of suppliers. The approval of criteria for awarding offers is imminent, but the modes concerning technological transfers and the notion of

compensation or "juste retour" have yet to be finalized. These questions and others should be addressed and put to vote in the near future. Until then, and for several years to come, numerous political and economic obstacles will have to be overcome before a European defence market can be developed, since European defence production and procurement are still fragmented into more than 10 national markets. However, it appears that all governments and industries involved are convinced of the necessity of this market and will take steps to overcome the obstacles.

A variety of restructuring moves form part of the movement toward the creation of a European defence industry. Presently, we are witnessing a greater number of collaboration programs, international purchases and a redistribution of the property of many companies in the defence electronic industry. Canadian industry will have to show greater vigilance with respect to these initiatives since they apply to Canadian exports in market niches where Canadian industry has a strong technological lead. Impacts on Canadian defence exports in the short and medium term should be minimal. However, the European procurement defence markets might open up only to IEPG member countries and hence remain closed to foreign suppliers.

In the long term, even if a unified and harmonized European market appears more attractive, the effect of the ongoing restructuring of the European industry may make it more difficult for the Canadian industry to complete in the European market as well as in third markets.

With regard to urban and inter-city transport industry, it must be noted that the directive COM (89) 380 concerning procurement procedures also applies to this sector.

The European mass transit (rail and subway) industry, of which the railway sub-industry is the best example of a de facto national monopoly, is managed by operators (many of them state owned) that are closely tied to the state. Domestic manufacturers (some of them state owned), are also closely tied to their respective national operators and have long enjoyed purchase policies steeped in nationalism.

On the whole, it can be expected that such nationalist considerations will continue to influence purchasing policies in this industry. The opening of public procurement to all EC companies will present new opportunities for joint-ventures and sub-contracts to highly specialized, large EC companies. This will be especially true for the large projects expected for the planned European high speed rail network. The opening of public procurement markets per se, however, will have very limited impact on the relatively few Canadian exports to the EC.

In the sub-industry of buses, over 300 entities have a fleet of over 50 buses, which operate within urban and inter-city networks throughout the Community.[80] In most cases, these companies belong to state or local government organizations. With the exception of the United Kingdom and Portugal, each country fills its procurement requirements from domestic suppliers. Some of these suppliers are state-owned companies. Despite the willingness, opening up procurement markets in this sector is unlikely to occur in the medium term, particularly since it might be impossible for some state-owned domestic suppliers to address intra-EC competition. All in all, the opening of public markets in this sector will have little or no impact on the Canadian industry, since it does not export to Europe.

2.3 Industrial Restructuring

The impact of European industrial restructuring is expected to be about the same for the three industries, except perhaps for the defence industry, where it will be more pronounced.

The elimination of borders between the Community countries will result in increased competition in the European industry, a process that has already begun. Part of the reaction has been an increased number of mergers and acquisitions. With respect to the aerospace and urban and inter-city transport industries, rationalization and co-operation have been commonplace for some years now. In the defence industry, the restructuring movement is more recent.

The aerospace industry is already largely globalized and organized on a Pan-European basis through

projects such as Airbus,[81] Tornado and EFA. Not long ago, this rationalization was limited to companies within the industry. Recently, however, more open government procurement policies have induced a further restructuring and led to an increased level of concentration, as diversified companies have ensured a place for themselves in the aerospace industry by merging with specialized companies. The recent formation of Deutsche Aerospace AG (DASA) means that now more than 70 per cent of the German aerospace industry will be controlled by a single company, therefore making it a major single player in the European contest. In England, Rover has joined with British Aerospace.

In the defence industry, Article 30 (6) of the Single European Act and the IEGP policy of European defence market unification have contributed to an acceleration of the restructuring process initiated by the globalization of these markets. Cross-boundary competition in defence procurement will induce companies to enter into intra-EC co-operation that could take various forms (holdings, consortia, or joint-ventures). The accelerated rationalization and concentration of the industry has taken place within the scope of the open European market movement, although it has happened outside the range of the Single European Act. The following is a list of such examples.

- MBB was taken over by Daimler-Benz;
- Plessey was bought by GEC and Siemens;[82]
- Phillips backed out of military electronics and sold its assets to Thomson and Siemens;
- the defence divisions of Thorne-EMI and Racal are up for sale, and Ferranti is expected to be up for sale; and
- European helicopters builders are expected to group together (Aérospatiale, MBB, Augusta and Westland), and similar unification should occur in the space industry (MBB, British Aerospace, Matra, Thomson, Alcatel, and so on).

These groupings are based on the concomitance of the following elements:

- a sharp increase in research and development costs;
- the stagnation and shrinking of world defence budgets;
- the fear that American manufacturers will spread out (geographical extensions) following reductions in the American defence budget; and
- a driving effect due to unification and rationalizing of these companies' civilian and defence activities (induced largely by Europe 1992).

Restructuring should bring to the European defence industry a reduction in the duplication of R & D efforts and, consequently, in the related costs and risks. Restructuring should also cause the rationalization of production, a decrease in marketing costs, and a change in the European industry's influence on the re-defining of the world market.

Negative consequences for Canadian companies (whose activities consist largely of subcontracts) could result from the reinforcement of the European industry and the increased competition in the declining military industry market.

Faced with more efficient and aggressive European competitors, it is almost certain that the Canadian industry will have greater difficulty selling its products in Europe and will have to address stronger competition in third markets.

In the long run, the restructuring of the European industry constitutes an additional threat to Canadian defence exports. Despite its fragmentation, the European defence industry has a wider technological base than does its Canadian counterpart. Moreover, the consolidation of the European industry should reinforce this technological base. The danger for the Canadian defence industry therefore lies at two levels. First, more efficient European R & D could induce rapid technological changes capable of wiping out Canada's advance in certain market niches.

Second, the American defence industry, coping with reduced military budgets, will likely seek to reinforce its link with the European defence industry, not only to profit from new opportunities created by a unified market, but also to participate in technological advances resulting from a rationalized R & D. The Canadian defence industry not only risks becoming isolated from the European market, but also losing a share of the American subcontracting market. In addition, past and present Canadian government procurement practices in the defence industry have precluded Canada from having a defence industry comparable to those in other industrialized countries. In such a business environment, the Canadian defence industry will be extremely vulnerable.[83]

In the urban and inter-city transport industry, the mass transit (railway and metro) industry has already restructured into national groups, and the opening of procurement markets in this industry will accelerate mergers and intra-EC affiliations. This movement has recently witnessed the merger of giants such as GEC (United Kingdom) and Alsthom (France), as well as Asea (Sweden) and Brown Boveri (Switzerland). Although the latter two are non-Community companies, they have plants in the main EC countries and thus play a key role in the Community.[84] Further rationalization by other European companies is considered inevitable, and the merged companies are expected to be favoured by national governments. With the exception of major producers such as Bombardier, which has major investment in the EC, Canadian companies will find that the European market remains highly protected, with access still difficult. A major threat for Canadian manufacturers will be the enhanced competition from EC companies for third country projects as the result of a stronger, rationalized, European production base.

European bus manufacturers have responded by increasing their foreign investments, especially in the U.S., rather than restructuring within Europe. It is likely, however, that the opening of markets in this sector will force the industry to rationalize its excess production.

2.4 Research and Development Aid Programs

Up until the mid 1980s, European Community countries co-operated very little in civilian and military R & D. The European industrial community is now actively pursuing a greater degree of self-sufficiency in high technology and, in particular, an enhanced competitiveness on the world market (especially vis-à-vis the U.S. and Japan). Believing its future competitiveness in areas of state-of-the-art technology to be threatened, Europe recently implemented aid programs to encourage cross-boundary co-operation and to eliminate R & D duplication. Among these European Community programs, five are particularly likely to have an impact on the industries concerned in this study:[85]

- ESPRIT (European Strategic Program of Research in Information Technology);
- BRITE (Basic Research into Industry Technology for Europe);
- EURAM (European Research in Advanced Materials);
- RACE (Research in Advanced Communications for Europe); and,
- EUCLID (European Collaboration for the Long Term in Defence).

ESPRIT, BRITE, EURAM and RACE are programs designed and administered by the EC.[86] Although Community programs are for the most part civilian in nature, most cover mixed technologies, and the innovations arising from them will no doubt have applications for European military products. For example, ESPRIT should improve the EC's competitive position in the market for semi-conductors commonly used in civilian as well as military equipment, and EURAM could facilitate the development of new materials for use in the production of propulsion systems and higher performance aircraft parts.

More recently, under the auspices of the IEPG, member countries adopted the EUCLID program, intended to foster European co-operation in military

research.[87] The primary driving force that led to the formation of EUCLID was not one of strategic military necessity, but one of industrial survival. The initial budget for this program for 1990, its first year of existence, is $165 million. It is expected that if EUCLID is as successful as the European Research Co-operation Agency (EUREKA)[88], its sister program in the civilian sector, the budget and commitment for EUCLID will rise significantly in the near future. Details on the EUCLID program can be found in Appendix C.

These programs all assume a highly important role in the development of a European R & D synergy and co-operation. Although there appears to be progress in several areas, existing programs have not yet led to important discoveries, and the EUCLID project should not result in any short-term technological breakthroughs. The impact of these programs lies more in their attempt to promote a spirit of co-operation across national boundaries, which in the long run should lead to technological advances and enable the European industry to play a key role on world markets.

The objective of these programs is to provide Europe with the technologies that will enable it to compete with the U.S. and Japan. Participation of foreign companies will be possible only insofar as it will satisfy a clearly identified deficiency. These programs not only represent a solution to Europe's need to catch up, but also address the desire to place Europe in a leading position with respect to emerging technologies. The new flexibility in co-operation between public and private sectors only puts this desire into concrete form.

The Canadian industry's R & D efforts, having brought a technological advance in certain market niches, will have to be maintained and increased. Otherwise, technological advances resulting from rationalized European R & D could seriously compromise Canadian product competitiveness.[89]

2.5 Implementation of Customs Tariffs on Defence Products

The implementation of customs tariffs on imports of military equipment depends on the importing country. Some countries, such as Great Britain and Italy, grant duty-free entry for imports that are intended for national security or defence purposes. Other countries, such as France, the Federal Republic of Germany and the Netherlands, levy duty on these same imports, whether they enter from outside or inside the Community.

Based on the principle that the exclusive jurisdiction on national security conferred to the EC by Article 223 of the Treaty of Rome does not give individual states the right to grant exemptions from Community tariffs, the European Commission has proposed to abolish the exemptions from customs duties granted by certain member states. According to the Commission, tariff exemptions granted by member states on certain items supposedly intended or required for defence purposes have caused the loss of close to $260 million in EC revenues, since some of these goods were subsequently released into the civilian economy without recovery of customs duties.[90] However minimal, this loss is the result of the actions of a few member states but has been to the detriment of the EC as a whole and, as such, cannot be justified in the eyes of the Commission.

In the interim, while the Commission waits for the 12 member states to vote on the proposal, it has suggested a compromise solution permitting a temporary suspension of duties at 0 per cent to cover a list of equipment similar to the one established by Article 223 of the Treaty of Rome. This list, still not made public, could conceivably be either very short or expanded to include components and sub-assemblies, which constitute the bulk of Canadian sales to Europe.

Should the proposal be adopted, the impact on Canadian defence exports could be very negative. First, the imposition of tariffs, varying between 3 and 5 per cent but possibly reaching 14 per cent, would greatly harm the competitiveness of Canadian products, especially in the fields of communications and electronics. In 1988, between $300 and $350 million[91] worth of Canadian defence exports to Europe would have been affected by such a measure. Furthermore, European protectionist thinking could jeopardize NATO co-operative programs, which have enabled several Canadian companies to establish commercial ties with European partners.[92]

Finally, these measures risk leading to reprisals on the part of Canadian and American governments. The proposal remains severely contested both within and outside the EC, and its adoption cannot yet be assumed. It is doubtful that this question will be solved in the near future, and it should be subject to close scrutiny by the Canadian defence industry.

2.6 Standards

Increased transparency in procurement procedures is not sufficient to open up public procurement markets if specifications and technical standards become non-tariff barriers for third countries.

The enforcement of different technical standards and specifications have long constituted a non-tariff barrier to intra-EC trade and co-operation. Since 1985, the EC has been attempting gradually to remedy this problem by establishing all-European standards. Even if European standards were created before 1985, it is only since the 1985 White Paper that normative questions have come under close scrutiny.

The establishment of Community-wide standards should liberalize market access and facilitate the movement of goods originating from both intra-EC and extra-EC countries.

Standards and certification play an increasingly important part in the global market. Therefore, it is important that, in a global marketing environment, Canadian companies ensure their products are certified to accepted international standards. If the EC follows ISO (International Organization for Standardization) standards, the establishment of European standards should have little or no impact on Canadian exports to Europe in the industries covered by the study. However, it seems likely that in some cases the EC will be setting its own standards.

Almost all of the commercial aerospace industry products are subject to international standards, established in accordance with the Common Navigational Code. This code has been enforced in Europe the same way the Code of Federal Regulations of the Federal Aviation Administration (FAA) has been enforced in the U.S. The *Association européenne des constructeurs de matériel aérospatial* is presently working on an all-European standards (largely inspired from American standards).

In the defence industry, there is still no harmonization policy. The IEPG's intentions regarding the development of all-European standards for defence equipment and whether these standards would be different from those of NATO, are still unknown. However, it may be that, if adopted, all-European standards will not differ from NATO standards.[93] For dual use civil/military products, the development of European standards for civilian products and the European Commission's reform program calling for mutual recognition and equivalence will certainly affect intra-European defence procurement, and could eventually affect Canadian exports. In fact, if these standards differ from North American standards, it may prove costly to adapt Canadian products for a market that represents only a small percentage of Canadian exports. The possible adoption of European standards for telecommunication systems, motorized vehicles and electronic systems should therefore be the subject of particular scrutiny and concern for the Canadian industry.

In the urban and inter-city transport industry, differences in specifications and standards such as in rail gauge, waggon-load, electrical systems for rail transport equipment, and security and operating standards in bus transport are still significant between member states. Despite these differences and the need to pursue the elaboration of all-European standards, a substantial number of International Organization for Standardization (ISO)[94] standards and a certain amount of material compatibility already exist.

The European industry uses International Union of Railways (IUR) standards while Canada, the U.S., and Latin America use the North American industry standards defined by the Association of American Railways (AAR). On the whole, AAR standards are generally higher than IUR standards, and the Canadian industry can manufacture many components conforming to either set of specifications. Hence, Canadian manufacturers are not precluded from attempting projects in countries using IUR standards. Therefore, the adoption and development of new European standards should not

create problems for Canadian exports to the EC.[93] Overall, Canadian trade with Europe is not expected to be affected, as far as mass transit equipment is concerned. Nevertheless, Canadian manufacturers will have to face enhanced competition from a rationalized EC industry in third country markets.

3. STRATEGIES

3.1 Private Sector

Canadian companies must not delay the development of strategies to enable them to face the challenge and must take advantage of business opportunities that could result from Europe 1992. The impact of a Single European market, and the strategies corresponding to its implementation, depend greatly on the company's situation in its own market, on the European market, and on its sector of activity. Each strategy must be tailored to the individual company and will vary according to a number of factors, such as whether the company either is established in Europe, exports to Europe, or has no commercial ties with Europe.

a) Companies Established in Europe

Some large Canadian companies have anticipated the coming of Europe 1992 and have established themselves in Europe. The best known examples are Bombardier and CAE Electronics. The presence of these companies in Europe has enabled them to sign substantial contracts that would otherwise have been practically out of reach. Insofar as the European Commission has demonstrated its intention to impose Community content requirements, EC standards, customs tariffs and other protectionist measures, companies already established in Europe will benefit from easier access to liberalized government procurement markets.

However, access does not necessarily equal success. With the industrial giants presently being formed in Europe, competition is growing more intense. In this context, market niches and technological advances do not necessarily guarantee long-term success. On the contrary, any Canadian company established in Europe will have to face the same restrictions and decisions as its European counterpart or competitor. There are two main possible strategies for these companies: expansion by merger and acquisition or the formation of strategic alliances or joint ventures.

Expansion by means of a merger or acquisition represents a major investment in terms of capital and human resources, but it can create interesting spin-offs, since such moves permit an immediate gain of market share and goodwill, as well as entry into markets where barriers are high and where well-established players already exist. For instance, Bombardier, having first established itself in the European rail industry by acquiring the Belgian builder *BN constructions ferroviaires et métalliques SA* in 1986, subsequently acquired the second largest manufacturer of railway materials in France, ANF Industrie. ANF Industrie and BN are part of two consortia selected to manufacture light vehicle transport wagons and the Trans-Manche Super Train (TMST). From GEC-Alsthom, Bombardier has secured, via licence, its access to European high speed train technology[96] and will thus be able to offer a more complete range of mass transit material.

For many other companies already established in the Community, the formation of strategic alliances can represent a viable alternative. Such alliances can prevent suicidal competition, permit the sharing of otherwise potentially prohibitive R & D and marketing expenses, protect a market, access complementary technologies, and allow the alliance to tender for and execute otherwise inaccessible contracts. The best example of a strategic alliance involving a Canadian company is that involving Bombardier and its Belgian subsidiary BN in the consortium selected to execute part of the work related to the Eurotunnel. Not only has this alliance enabled Bombardier to secure a contract in which its share is evaluated at $425 million, but it has also led to Bombardier's involvement with ANF Industrie, which it later acquired.[97]

To facilitate the creation of strategic alliances and collaboration across national borders, the European Commission adopted a directive offering companies, since July 1, 1989, a new type of legal structure: the European Economic Interest Grouping (EEIG). It is important to note that non-EC companies or individuals can participate in a EEIG only through a subsidiary registered in the Community. Furthermore, a EEIG must be formed of at least two members from different EC member states. The advantage of this new legal structure lies in its

enabling its members to undertake a variety of joint actions while preserving their legal identity and economic independence. All profits generated by the EEIG's activities will be deemed to be the profits of the members and will be apportioned among them in equal shares if not specified in the contract. The formation of a EEIG represents a low-cost strategy and may prove important to the establishment of a long-term relationship between two or more companies.[50]

b) Companies Exporting to Europe

Companies that have traditionally exported only to Europe will have to seriously reconsider their approach toward the new European market. These companies will quickly realize that the proposals regarding the opening of government procurement markets are not applicable to them and that competition from a re-structured European industry will likely increase. For companies wishing to increase their European market or improve their competitive position, three main strategies should be examined: (i) the establishment of a European subsidiary, (ii) the acquisition of an existing company, or (iii) the creation of strategic alliances and joint ventures.

The establishment of a European subsidiary requires considerable investments of human and financial resources and is often a viable alternative only for large companies. It requires in-depth knowledge of the markets, taxation laws, accounting practices, working relations, and other current practices of the country where the company intends to establish itself. Such a strategy may prove to be extremely costly and represents a high risk with no long-term guarantees of success. However, it provides the opportunity to start with the newest equipment and technology and to choose the desired location. CAE Electronics is among the Canadian companies that have adopted this strategy. To provide maintenance for its simulators sold to European NATO countries, CAE established itself in the Federal Republic of Germany, where it presently employs 500 people. The company expects to expand its operations shortly. Com Dev is another example of a Canadian company establishing itself in Europe. Because of their products' tailor-made nature, which would provide them with a niche opportunity and because of the politics involved in selling to the European Space industry, the company decided that a European presence was necessary. The company established Com Dev Europe in 1985 in the U.K., where it now employs 30 people.

Of the proposed strategies, the most efficient is probably the acquisition of an existing European company. Not only is acquisition the quickest method for a Canadian company to establish itself in the EC, but it also enables the company to benefit from business ties and expertise already developed by the acquired organization. Nevertheless, this strategy is not within the reach of every company; it requires a realistic evaluation of the company's financial and administrative strength. An example of such a strategy is Bombardier's acquisition of the oldest European aeronautical builder, Shorts Brothers from Ireland. This acquisition, in addition to providing Bombardier with a solid base within the EC, also provided direct access to the British defence market. Moreover, Shorts has concluded a deal evaluated at $75 million with the British Defence Ministry and an unnamed third country to supply Javelin missiles. In one fell swoop, Bombardier succeeded in eliminating an important potential competitor, since Shorts was developing an aircraft destined for the same market as the Regional Jet, the Canadair division's forthcoming product. Bombardier's strategy seems to have resulted in many advantages while allowing Bombardier to reassert its position on the European market.

Finally, there are strategic alliances, of which the advantages were discussed in section a). In the case of exporting companies, however, the company cannot have recourse to the EEIG unless it establishes a subsidiary within the Community. For an exporting company, an alliance with one or several European companies can serve to maximize the Community content of its exports, ensure the costs of developing a product are shared, or mutually ensure the sale of the products of both or all companies on their respective markets (cross-marketing). These alliances may involve a minority participation in the Community company, an exchange of shares between the partners, or simply an agreement without participation.

c) Companies without any Commercial Ties with Europe

In these times of market globalization, it is risky for a Canadian company to limit sales to its traditional export market, the United States. Such companies are exposing themselves to eventual increased competition from European industry on third markets and even on domestic markets. They are also shutting themselves off from business opportunities provided by a more open and less fragmented European market. Moreover, these companies risk losing important subcontracts with U.S. contractors, which, in seeking to increase the Community content of their exports to Europe, might substitute European subcontractors for canadian ones.

Most of these companies should re-evaluate their strategies and seek to establish initially low-risk ties. Using agents to test the acceptance of products in the European market, setting up a sales office, or establishing of joint ventures are some of the means by which these companies may enter the European market. While these suggestions may be ways to explore the EC market, no success is guaranteed.

Canadian companies without any commercial links with Europe should at least strengthen the subcontracting ties they have with Canadian and American companies to ensure that they are not left behind. By participating indirectly in this way, they may also be able to benefit from spin-offs that might result from Europe 1992.

d) Defence - Special Considerations

In the Canadian defence industry, the previously developed strategies are likely to facilitate access to the European defence market as advocated by the IEPG; avoid the eventual implementation of Community customs tariffs; and, enable the industry to participate in EC and IEPG research and development programs. However, the strategy adopted by a company, whether it proceeds from the establishment of a foreign presence, acquisition of an offshore subsidiary or the formation of a strategic alliance, must take into consideration the recent developments in defence world markets.

As previously mentioned, defence budgets are suffering extensive cutbacks in all NATO countries, and markets are shrinking. The U.S., the main export market for Canadian products, will reduce its military budget by 1992, which will lead to a major restructuring of the U.S. defence industry. Notwithstanding diminished defence expenditures, development of high technology defence systems will remain a high priority.

In this new environment, it seems that only companies that are leaders in their own sector of activity, and are capable of maintaining a substantial and continuous R & D effort, will be able to overcome the expected competition and establish themselves in Europe. Other companies will find it increasingly difficult to make their defence-related activities profitable. The best strategy for these companies lies in the reorientation of their activities from military towards civilian, although a balance between military and civil production would be desirable to properly diversify in the event that unexpected declines in market shares do occur. Among Canadian companies having adopted such a strategy, or preparing to do so, are Héroux Inc. and Oerlikon Aerospace.

Héroux, a company specializing in the design, manufacture and maintenance of landing gear, with 70 per cent of its production devoted to the defence sector, has chosen to diversify its position on the market by expanding into the upgrading of landing gear of aircraft for large commercial airlines. The company considers that its refurbishing activities constitute a market niche with good prospects that will result in reducing Héroux's dependence on defence markets.

At Oerlikon Aerospace, prime contractor for the procurement program of low-altitude air defence systems, 95 per cent of revenues come from the defence sector. Faced with global market reductions, Oerlikon is presently investigating possible civilian applications of the technology it has developed for the defence sector. The long-term objective is to draw 50 per cent of its revenues from activities of a civilian commercial nature. Among the considered sectors, Oerlikon will give priority to space and environment.

Recent events in Eastern Europe and in the Persian Gulf, the calling into question of NATO's role and the impact of reduced defence budgets should force companies in this sector to review their planning and to choose the best strategy adapted for this new and uncertain environment.

Appendix A

TABLE 1

Opening of Community Public Markets
Progress chart

Field	Date of Proposal Commission	Projected Council Adoption Date
1985 to 1986		
Improvement of public markets directives	1985	1987
1987 to 1992		
Improvement of public markets directives	1987	1988
Extension of directives to the excluded sectors: telecommunication and energy	1987	1988
Public markets in the field of services: opening of markets to priority sectors	1987	1988
Public works markets:[99] further harmonization of procedures	1989	1989
Public services markets:[100] other sectors	1989	1990
Extension of directives to the excluded sectors: electricity and hydro	1989	1991
Application of the directives 1990 to 1992	1989	1990

Source: BIPE

Appendix A cont'd

TABLE 2

Canadian Aerospace Industry Exports 1984 - 1988

	Percentage to the EC	Percentage to the U.S.	Percentage to Other Destinations
1984	8.5	75.6	15.9
1985	11.4	75.2	13.4
1986	12.2	67.9	19.9
1987	13.9	74.3	11.8
1988	16.6	70.9	12.5

Source: Merchandise trade by industrial sector, ISTC.

TABLE 3

Canadian Aerospace Industry Imports 1984 - 1988

	Percentage from the EC	Percentage from the U.S.	Percentage to Other Parts of the World
1984	4.1	94.4	1.5
1985	6.7	90.8	2.5
1986	8.6	81.5	9.9
1987	8.7	88.5	2.9
1988	29.7	67.4	2.9

Source: Merchandise trade by industrial sector, ISTC.

Appendix A cont'd

TABLE 4

Estimated Commercial Space Expenditures - 1987
($ million)

United States	9 000
France	1 000
Japan	1 000
West Germany	480
Italy	365
India	325
United Kingdom	220
Canada	170

Source: *Industry Profile, Space*, ISTC.

Appendix A cont'd

TABLE 5

Major European and American Aerospace Companies

Companies		Sales 1987 million ECU	Employees Units
European Companies			
British Aerospace (U.K.)	(16%)*	5 733	93 083
Aérospatiale (France)	(10%)	3 609	32 827
MBB (Federal Republic of Germany)[101]	(9%)	2 946	36 897
Rolls Royce (U.K.)	(8%)	2 844	42 000
Dassault (France)[102]	(6%)	2 179	14 711
SNECMA (France)	(4%)	1 355	13 434
Aeritalia (Italy)	(3%)	1 062	13 662
Matra (France)	(3%)	952	5 800
Fokker (Netherlands)	(2%)	834	11 709
Dornier (Federal Republic of Germany)	(3%)+	776	9 683
MTU (Federal Republic of Germany)		628	7 200
Agusta (Italy)	(1%)	428	4 656
Westland (U.K.)	(1%)	360	4 661
Casa (Spain)	(1%)	334	10 595
Fiat Aviazone (Netherlands)	(1%)	n/a	n/a
SEP (France)[103]	(1%)	n/a	n/a
Other European companies	(30%)	n/a	n/a
American Companies			
Boeing		13 400	125 980
McDonnell Douglas		10 514	99 300
Lockheed		9 794	97 300
UTC		5 658	86 800
Northrop		5 280	46 536

* Percentage in brackets is the share of company sales on total European sales.

\+ Dornier and MTU

Source: *Europe in 1994*, BIPE

Note: Example of European Collaboration Programs

Large front-end expenses have induced companies to join international programs, and there is a marked increase in industry companies wishing to participate in international programs. Thus, General Electric (U.S.) and SNECMA (France) have joined forces in a partnership to produce the best-selling engine in the large aircraft market, the CFM56. This engine powers the Boeing 737-300, most of the Airbus A320, and the re-engined McDonnell Douglas DC-8 and Boeing KC-135 aircraft. The engine is assembled in France and the United States. The competing engine consortium is International Aero Engines (IAE), formed by Pratt & Whitney, Rolls Royce (U.K.), Japanese Aero Engines (Japan), MTU (Federal Republic of Germany) and FIAT Aviazione (Italy). This consortium manufactures the V2500 engine, which competes with the CFM56 for Airbus A320 sales. Rolls Royce also plans to develop the RB211-524L, which will compete in the market for the McDonnell Douglas MD-11, Boeing 767 and Airbus A320. Should this engine be used in the Airbus 330, it would be the first Airbus to be produced without any significant American participation.

Appendix A cont'd

TABLE 6

Example of European Collaboration Programs

	AS (F)	AMD-BA (F)	AIT (I)	BAS (UK)	CASA (Sp)	DORNIER (FRG)	FOKKER (NL)	MBB (FRG)	SABCA (B)	OTHERS*
Civil Aircraft										
Airbus[104]	*			*	*	*	*	*	*	
ATR 42/72	*	*								
Concorde	*			*						
Fokker[105]		*					*	*	*	*
Military Aircraft										
Jaguar		*		*						
Tornado			*	*				*		
Alpha Jet		*				*			*	
EFA			*	*	*	*		*		
Transall	*							*		
Atlantic-1/2	*	*	*			*	*		*	
Helicopters										
Puma	*								*	*
Gazelle	*									*
Lynx	*									*
EH 101									*	**
HAP-HAC/ PAH2	*							*		*
NH 90	*						*	*		*
A129 LAH					*		*			*

* Shorts (UK), Agusta (I), Westland (UK).

Source: *Vers un programme de mesures stratégiques pour la recherche et la technologie aéronautique européennes*, EC-DG XII, 1989.

Appendix A cont'd

TABLE 7

Privately Funded R & D Expenditures
Major European and American Aerospace Companies
(as a percentage of sales, in 1986)

European Companies	R & D Expenses in percentage of Sales	American Companies	R & D Expenses in percentage of Sales
Snecma	13.50	Northrop	6.75
Aérospatiale	10.50	Allied Signal	6.20
Rolls Royce	7.33	UTC	5.44
Matra	7.27	Lockheed	4.80
Fokker	6.91	Sundstrand	4.63
MBB	5.77	Boeing	4.63
MTU	5.52	Martin Marietta	4.61
Casa	4.71	McDonnell Douglas	3.99
British Aerospace	3.51	General Electric	3.64
Westland	1.66	Raytheon	3.48

Source: *Panorama of EC Industry*, 1989.

Appendix B

NEW MATERIALS

The 1990s will witness an ever-increasing use of new materials in the production of airframe structures, as composite materials, tailor-made for particular parts of the aircraft, are developed. Up until now, the weight of an aircraft has been made of aluminium alloys (75 per cent), steel (10 per cent), titanium (10 per cent) and composite materials (5 per cent). An example of the increase of composites as a share of the total weight of the aircraft is the Airbus family. Composites comprise 4.5 per cent in the Airbus A300, 8 per cent in the Airbus A310 and, in the latest model, the A320, 18 per cent. Composites based on polymers offer the most potential (low density, high strength and stiffness). Composites will rival the new metal technologies, which have produced advanced light alloys such as aluminium/lithium.[106]

Trends in aircraft composition and shell structure
A340 type aircraft

	Aluminium		Composites	Steel/Titanium	Other
	Traditional	Lithium			
Before introduction of aluminium/lithium alloys	50%	nil	15%	20%	15%
After introduction of aluminium/lithium alloys	30%	20%	15%	20%	15%

Source: *Europe in 1994*, BIPE from Aérospatiale.

Appendix C

EUCLID PROGRAM

Funds approved for the EUCLID program will serve to finance projects concerning one or the other of the 11 strategic technologies (Common European Priority Areas [CEPA]) thus far identified by the IEPG:[10]

- modern radar technology, concentrating principally on airborne radars (Federal Republic of Germany);[10]
- silicon micro-electronics, complementing the large effort currently being undertaken in the civilian sector under the Joint European Semiconductor Silicon Initiative (JESSI), the focus chiefly on military circuits, technologies and applications (France);
- composite materials, i.e., material behaviour under operational conditions, detection of damage/failure, repairs under operational conditions, increased high-temperature resistance for hyper-velocity missiles applications, electromagnetic windows and structures for protection (Netherlands);
- modular avionics, complementing the joint effort currently being undertaken by France, the Federal Republic of Germany, the U.K. and the U.S. (the Group of Four) and concentrating on concept and systems studies, components for a central core and general characteristics of the modules for the purpose of future integration of avionic packages currently available in the cockpit (Federal Republic of Germany);
- electromagnetic guns, i.e., rail guns, reel guns, thermo-electric guns and problems associated with the storage of high levels of electrical energy and the switching of large currents (United Kingdom);
- artificial intelligence, i.e., intelligent cockpits, applications to training and simulation, decision aids and autonomous systems (France);
- signature processing, i.e., radar signatures and optical, infrared and acoustic signatures (Spain);
- opronics, i.e., night vision, lasers, image processing, fibre optics networks and detectors (Italy);
- surveillance satellite technology, i.e., hardened sensors, hardening of ground-based systems and real-time data processing (Norway and France);
- underwater acoustics, i.e., long-range active sonar, short-range active sonar and passive sonar (United Kingdom and the Netherlands); and
- simulation, the recently introduced CEPA that still remains to be defined.[10]

NOTES

1. France enjoys a particular status by remaining a member of NATO although it retired in February 1966 from the Unified Military Command.

2. The EDIG, established in 1976, groups together European NATO member countries, so that all steps taken by this group toward the opening of public procurement markets will likely result in benefits only for its members, effectively leaving out those countries that are part of NATO but not part of the EDIG -- that is Canada, the United States and Iceland.

3. The EC public procurement markets will remain difficult to penetrate and protected (not necessarily by the EC). There remain difficulties related to a lack of business strategy for entry into unclustral territories/markets.

4. Public sector purchases (public markets) fall into two categories: those made by the state itself and those made by nationally mandated organizations. An example of the latter in Canada is Via Rail.

5. *The Cost of Non-Europe in Public Sector Procurement*, W.S. ATKINS Management Consultants.

6. EC expenditures in major weapons consist of $11 686 billion from France, $10 751 billion from the U.K., $6263 billion from the Federal Republic of Germany, $5134 billion from Italy, $1826 billion from Spain, $1690 billion from the Netherlands, $972 million from Greece, $605 million from Belgium, $625 million from Denmark, $175 million from Portugal, $55 million from Ireland and $2 million from Luxembourg. In comparison, U.S. expenditures in major weapons are estimated at $66 274 billion, Japanese expenditures at $8.6 billion dollars and Canadian expenditures at $6.1 billion. The conversion factor used to change U.S. dollars to Canadian dollars is 1.2307.

7. The term directive refers to proposed measures by the European Commission aimed at bringing about the integration of the European Single Market. There are 279 directives that form the core of the internal market project. To be incorporated into national law of each member state and put into practice, they have to be adopted by the European Council in a form of majority voting.

8. Source: Aerospace Industries Association of Canada (AIAC).

9. There are other significant manufacturers (electronic systems), such as Canadian Marconi Company and Litton Systems Canada.

10. Source: Statistical Survey Report, 1989, Industry Science and Technology Canada (ISTC).

11. Some estimates place Canadian re-exports to EC from the U.S. as high as 50 per cent.

12. Source: Industry Profile, Aerospace, ISTC.

13. Avions de transport régional (ATR), consortium of Aérospatiale SA of France and Aeritalia SpA of Italy.

14. The majority of third tier Canadian companies are small companies that generally act as subcontracting suppliers. They tend to be suppliers mostly to first and second tier companies. However, some have proprietary technology and export directly.

15. Over 60 per cent of capacity utilization in the U.S. aerospace industry is directed to defence-related production. Such is also the case in most EC countries and in Japan.

16. Source: Military Industry Research Group (Groupe de recherche sur l'industrie militaire (GRIM)), UQAM.

17. Sources: *Industry Profile, Aerospace*, ISTC, 1989 and *Panorama of EC Industries*, BIPE, 1989.

18. Distribution of federal government contributions and contracts between the provinces for the April 1984 to March 1988 period was as follows: Quebec, 40 per cent; Ontario, 31 per cent; British-Columbia, 11 per cent; Prairies, 14 per cent; Atlantic provinces, 0.1 per cent; and other countries, 3 per cent.

19. MacDonald Dettwiler and Associates (MDA) of Richmond, British Columbia, designed and installed many satellite ground receiving stations in foreign countries.

20. Spar Aerospace Limited is the company designing and developing tele-operators.

21. Developed by Bristol Aerospace.

22. Source: Aerospace Industries Association of Canada (AIAC).

23. The success of Airbus is largely due to a heavily subsidized development and production program and the adoption of advanced technology, particularly in materials applications, systems for flight control and safety, and aerodynamics.

24. Source: BIPE.

25. The increased importance of the civil aviation business, more than 60 per cent of which is invoiced on U.S. dollars, makes the European industry very vulnerable to variations in the value of American currency.

26. According to EC estimates, shipments of civil aerospace equipment (aircraft and helicopter) should represent 46 per cent of total shipments (military and civilian) for the period from 1987 to 2000.

27. Source: *Europe in 1994*, BIPE.

28. According to EC estimates, shipments of commuter aircraft should represent 2 per cent of total aircraft and helicopter shipments (military and civilian) for the period from 1987 to 2000.

29. Westland is owned by Sikorsky.

30. *Le dossier de l'Europe, Transports aériens et aéronautique: vers l'Europe de demain*, 1989.

31. Source: BIPE, IFO, PROMETEIA.

32. The military helicopters HAP/HAC and NH-90 are NATO's programs.

33. Source: *Panorama of EC Industries*, BIPE, 1989.

34. By the terms of its Convention, ESA is limited to systems concerned with the peaceful uses of space.

35 Arianespace hopes, with its Ariane series of launch vehicles, to maintain its market share in spite of the comeback of American competitors (after the Challenger accident) and the new competition of newly industrialized countries such as Japan and Brazil.

36 With a payload capability into geostationary transfer orbit in excess of 8 tonnes.

37 This case is under review by the U.S. Department of Transport.

38 Source: *Task Force on Europe 1992, Report of The Working Group on Defence Products*, External Affairs and International Trade Canada.

39 Source: External Affairs and International Trade Canada.

40 The Defence Production Sharing Arrangement (DPSA) was signed in 1956, and the Defence Development (DD) in 1963. Canada joined the North American Aerospace Defence Command (NORAD) in 1958. NORAD is periodically renewed, and occasionally minor changes are incorporated but it is not renegotiated. Likewise, the DD/DPSA is occasionally updated, streamlined and added to, but not renegotiated.

41 Source: Industry Profile, Defence Electronics, ISTC.

42 There are 120 Canadian companies certified by the U.S. Department of Defense. They have access to contracts that would otherwise be available only to U.S. contractors. However, within the DD/DPSA agreements, there is a floor price of US$200 000 dollars, below which contracts do not have to be opened to Canadian companies.

43 Source: External Affairs and International Trade Canada.

44 Source: Industry Profile, Defence Electronics, ISTC.

45 There are four important European players in the industry: the U.K., France, Italy and the Federal Republic of Germany. To a certain extent, the Netherlands also plays a major role.

46 Sometimes standards and procedural problems can make it easier for a firm to collaborate with a U.S. partner than with a European one.

47 Evidence of this is the adoption by the U.S. armed forces of the Beretta automatic pistol and the FN MINIMI assault rifle and the exports of European weapons to many other countries.

48 Guided weapons may be characterized as air-to-air, air-to-surface, surface-to-air, surface-to-surface and "smart" gun launched projectiles.

49 This encompasses surface warships, that is, aircraft and helicopter carriers, cruisers, destroyers and frigates.

50 France, the Federal Republic of Germany, the Netherlands and the U.K. have the technology base for submarine design. Production capabilities are more widespread, and several nations build submarines under licence using designs from these countries.

51 *Towards a Stronger Europe*, Vol. 2, IEPG.

52 Overall, the U.S. leads Europe in this technological base, but less so in the defence sector than in the field as a whole.

53. *Financial Times*, March 20, 1990.

54. Source: ISTC.

55. Source: *Panorama of EC Industries*, BIPE, 1989.

56. Bombardier also acquired ANF in France and Procor Engineering Ltd. of the U.K.

57. UTDC also has licensing agreements with Macosa of Spain and ANSALDO of Italy.

58. European producers are now beginning to adapt their buses to North American market operating conditions. In addition, trends toward wider, more comfortable and luxurious vehicles to compete against other modes of transportation will increase competition from European manufacturers.

59. ORI is selling to Sweden, which is a European Free Trade Association (EFTA) country.

60. Industry Profile, Buses, ISTC.

61. Because of the "Buy America" policies.

62. Alstom is the world leader in this industry.

63. Source: UNIFE.

64. Source: *Bulletin of the European Communities*.

65. Intra-EC trade represents only 20 to 30 per cent of extra-EC trade.

66. CER includes the 12 EC member states, as well as Austria and Switzerland.

67. Although in the U.K. there is a degree of competition.

68. Source: *Bulletin of the European Communities*.

69. According to a study by BIPE, *Panorama of EC Industries* (1989), these two market segments should see the highest increase.

70. The expected average annual growth rate of rail transport is 1.0 per cent for the 1988-94 period.

71. The expected average annual growth rate for passenger transport is 2.2 per cent for the period 1988-94.

72. Source: *Bulletin of the European Communities*.

73. Source: *Bulletin of the European Communities*.

74. The exceptions are the two largest Canadian manufacturers -- Bombardier and UTDC -- which have taken steps to ensure their participation in EC mass transit markets as EC (domestic) entities.

75. This is not a major shift in policy but rather a shift from favouring individual states to favouring the EC as a whole.

76. Source: Official Journal 127 of 20/5/88.

77. The WEU was created in 1954; however, with the establishment of NATO in 1958, the WEU became redundant. It continued as a forum for defence questions at a political level. Although it has now been revived, it has yet to establish a clearly defined role.

78. The Eurogroup, established in 1968, is more multi-faceted then WEU. Its primary purpose is to provide a pragmatic and flexible structure of working groups for fostering practical co-operative efforts in defence communications, logistics, military medicine, training and conceptual long-term defence equipment collaboration.

79. The IEPG operates at the level of both defence ministers and national armaments directors.

80. Source: *Bulletin of the European Communities*.

81. Thanks to heavy and massive governments subsidies. If there is a will, there is a way.

82. Thus trying to take a leading position in defence electronics.

83. The Canadian defence industry is also generally a specialized niche industry. European defence industry is merging to form a large, strong corporation, which will have "in house" capabilities that can displace the Canadian industry.

84. Note that Switzerland is a member of the Community of European Railways, along with the 12 EC member states and Austria.

85. The same group of countries, along with some other participants, take part in the industrial EUREKA program, which is not a EC program.

86. For example, in the context of BRITE/EURAM, the Euromart program represents 500 million ECU over a five-year period, grouping all the EC engine manufacturers.

87. The IEPG nations are generally defined as European NATO members, with the exception of Iceland, and the 12 participating countries in the EUCLID program are in turn the IEPG members nations, with the exception of Luxembourg.

88. The EUREKA project is not a Community program per se, but an initiative of European countries that the EC has joined. EUREKA is designed to improve industrial productivity and competitiveness in various sectors of the world market (robotics, information technologies, new materials, lasers and environmental protection).

89. It would appear desirable at this early stage for Canada to negotiate a formal observer status with respect to the EUCLID program, in order to keep abreast of forward-looking European military research projects.

90. Source: *Task Force on Europe 1992, Report of the Working Group on Defence Products*, External Affairs and International Trade Canada.

91. *The American/Canadian Viewpoint* presented at the International Seminar Toward the European Defence Equipment Market by Robert E. Marcille.

92. Within NATO co-operative armaments projects, for example, throughout the R & D phases, each time a North American component were imported by an EC partner in a collaborative project, the item would be subject to duty.

93. NATO's Conference of National Armaments Directors (CNAD) continues efforts to harmonize equipment requirements and set standards (STANAGS: standardization agreements) where European members in NATO play an active role.

94. ISO is an internationally recognized organization for quality standards. Having products certified to ISO standards is becoming increasingly important for doing business in the EC and EFTA countries.

95. However, it is evident that the Canadian industry will have difficulty merging Canadian standards and technologies with those of the European countries, and this will probably be the industry's the biggest barrier to exporting.

96. Bombardier signed a collaboration agreement with Alsthom for the North America high speed train. ANF has its own "turbotrain" and is in partnership with GEC Alsthom for the TGV Altantique and the Trans-Manche Super Train (TMST), which will cross beneath the English Channel.

97. Bombardier's participation in the Eurochuttle consortium jumped from $425 to $600 million following its acquisition of ANF.

98. More information concerning EEIGs can be obtained by contacting the Commission of the European Communities, Directorate General for Industrial Affairs and the Internal Market, ED. Berlaymont, 200 rue de la Loi B-1040 Brussels, Belgium.

99. Represent approximately 30 per cent of public markets.

100. Represent approximately 20 per cent of public markets.

101. Messerschmidt-Bolkow-Blohm

102. Avions Marcel Dassault-Bréguet Aviation

103. Société européenne de propulsion

104. Airbus A300/310/320/330/340.

105. F.27/Fo-50,F.28/Fo-100.

106. The use of aluminium/lithium alloys in the airframes of Airbus A330 and A340 and of military aircraft should make it possible to limit the loss in market shares in favour of organic composites in the mid term, although not necessarily in the longer term.

107. The various areas of technical activity to be included in the EUCLID program have been identified as Common European Priority Areas (CEPA).

108. In parenthesis is the name of the pilot country having the responsibility for ensuring progress in that particular CEPA.

109. *Defence News*, July 3, 1989, IEPG OK's Joint Research Venture.

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